Risk-Based Capital Requirements for Banks and International Trade: Evidence from Basel 2 Implementation in Turkey

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Abstract

We find that changes in risk-based capital requirements for banks can affect the real economy through international trade. We use a natural experiment – Basel 2 adoption in its Standardized Approach for all Turkish banks as of July 1, 2012 – to investigate the impact of new risk-weights applied to commercial letters of credit (CLC) on Turkey's related exports. We estimate the resulting payment-term-cost elasticity of CLC-financed exports to be roughly -0.8. Our findings are consistent with substitution across payment terms. These results expand our understanding of the effects of capital requirements, hence changes in export-financing costs, on international trade. (99 words)

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Effects of Basel 2 Implementation on Turkish Exports

1. Introduction

Many institutions involved in global trade raise serious concerns regarding the treatment of financial instruments related with exports and imports under later versions of Basel Accords. For example, in 2009 Robert Zoellick, the then president of the World Bank, suggested that 10%-15% of the decrease in global trade during the Great Recession might be due to lower provision of trade finance under Basel 2 (Financial Times, February 19, 2009).[1] A 2009 survey by the International Chamber of Commerce (ICC) reports that "the feedback … on Basel 2 … [suggests] that most banks are facing tougher capital requirements for their trade assets" (March 31, 2009, p.40). Other banking surveys indicate that (i) Basel 2 had a negative impact on banks' provision of trade finance for the majority of large financial institutions and that (ii) for a non-negligible proportion of banks the increase in the cost of trade finance products (such as commercial letters of credit or trade-related lending) is linked with higher capital requirements (Asmundson et al., 2011). Given such worries, G20 stated that it would "… evaluate impact of regulatory regimes on trade finance" (G20 Seoul Summit Document, 2010). Four years later we still know very little regarding the impact of changes in capital standards on international trade due to lack of research in this area.

In fact, there is very little *direct* evidence on the impact of Basel Accord rules on the real economy. One of our two main contributions is to help fill this gap by evaluating the effects of Basel 2 on trade flows. Most of the academic research to date has focused on the impact of capital requirements on banks' supply of loans (for example, Berger and Udell, 1994; Brinkmann and Horvitz, 1995; and Kashyap and Stein, 2004) or their investment in financial securities (for example, Leibig et al., 2007). One exception is Brun, Fraisse, and Thesmar (2013) who find that 2008 Basel 2 adoption in France lowered average bank capital required for loans by 2% and generating a 10% increase in average loan size. Importantly, they find that the aggregate firm borrowing and investment increased by roughly 12 billions euros (1.5% of corporate borrowing and 0.5% corporate investment), allowing the preservation of 235,000 jobs (1% of aggregate French employment) during a crisis period.To our knowledge, the effects of changes in capital requirements on the real economy through international trade – where banks have a crucial role in intermediating payments – have not been examined.

Our second contribution is to the emerging literature on the export or import payment terms and international trade flows (e.g., Schmidt-Eisenlohr, 2013; Antras and Foley, 2013; Mateut, 2012;

[1] Similar fears have been raised for Basel 3 coming into effect as early as 2013 in many countries. Basel 3 initially proposed that a 100% capital be set aside for any off-balance sheet item, including commercial letters of credit (see for example, Financial Times, October 19, 2010 and Wall Street Journal, February 6, 2011). Concerns raised by interest groups prompted a relaxation of the capital requirements for trade instruments under Basel 3 by the BIS (Financial Times, October 25, 2011).

Glady and Potin, 2011; and Auboin and Engemann, 201X). Thanks to our data spanning all manufacturing sectors (in contrast to Antras and Foley, 2013, whose data come from a single large U.S. poultry exporter), we can differentiate among trade flows given the category of payment used (as opposed to Glady and Potin, 2011, or Mateut, 2012, whose data cover only one method of payment): i.e., we can distinguish whether the trade flows are based on Cash In Advance (CIA) where the importer bears all the risk of the transaction as it pays the exporter prior to shipment; Open Account (OA) where the exporter bears all the risk as it gets paid by the importer upon receipt of goods; or Commercial Letter of Credit (CLC) where the importer's risk of payment-default is covered by its foreign bank's CLC that the exporter presents for payment to its local bank, which typically holds it as an off-balance sheet item. As a result, our empirical set-up allows us to calculate the average elasticity of exports (based on a wide range of manufacturing industries) when the (implicit) cost of CLC-based payments changes, after taking into account destination country's import-demand. To do this we exploit the (differential) changes in the capital requirements that occurred for CLCs (given the counterparty risk-rating classes) when moving from Basel 1 to Basel 2 to identify the impact on export flows. Our findings indicate that as the implicit cost of providing certain trade finance services (in this case, approving and holding the CLCs issued by foreign banks of the shipment destination country) decreased for Turkish banks, the associated aggregate exports increased, holding everything else constant. This is consistent with higher trade following decreases in the cost of payment terms. Finally, our results also complement the findings of the recent strand of research on the impact of Great Recession on international trade (e.g., Ahn, Amiti, and Weinstein, 2012; Asmundson et al., 2011; Levchenko, A., Lewis, L. and Tesar, L., 2010; Paravisini, et al., 2013), by (i) showing that international trade (at least in some industries) can react strongly to small changes in the costs of CLCs and (ii) suggesting that changes in capital requirements that took place during the same period might also have impacted exports and imports.

To the best of our knowledge, we are the first to investigate the impact of changes in Risk-Based Capital (RBC) standards on the real economy through international trade. We do so by examining changes in trade flows around the mandatory adoption of Basel 2 in its Standardized Approach (SA) form by all Turkish banks. More specifically, we analyze the effect of the changes in capital charges for the export-related CLCs that are held as off-balance sheet item on Turkish shipments to 153 countries over a two-year period around the adoption date of July 1, 2012. Under Basel 1 or the SA version of Basel 2, as any other off-balance sheet item, export-related CLCs are first converted into an on-balance sheet equivalent amount using a *credit conversion factor* that multiplies the notional value of the CLC. Then, the capital charge of the off-balance sheet CLC position is calculated by multiplying the obtained credit-equivalent amount with a *risk-weight* to adjust for counterparty exposure. While the credit conversion factor for off-balance sheet CLCs is equal to 20% under both Basel 1 and 2, the weights applied for different counterparty risk categories have changed under Basel 2.[2] Our identification scheme relies on the fact that, relative to Basel 1, the capital that Turkish banks have to put aside under Basel 2 for export-related off-balance sheet CLCs (with maturities higher than three months) that they hold decreased by 50% to 80% for investment-grade counterparty credit ratings, remained unchanged for below investment grade (non-default) counterparty ratings, but increased by 50% for the riskiest (imminent or actual default) rating categories (Caa1 or CCC+ and below).[3, 4] Our tests take into account the fact that Basel 2 allows banks to incorporate *non-rated* counterparties into either medium or lowest risk (i.e., medium to highest rating) categories We also re-conduct our tests using risk-weights applied to short-term (less than three months) CLCs.

The Turkish data that we study have unique features that allow us to identify whether Basel 2, in its most basic form in which it was adapted, has any impact on CLC-based exports. First, Turkey is an economically relevant case to study. The country, which is a member of OECD, WTO and the G-20, is the world's 17th largest economy, its 22nd largest exporter by value (15th largest exporter in manufactured goods that we examine) and the 14th largest importer.[5] Turkey is also in a customs union for manufactured goods with the E.U. since 1996. It is the fifth largest exporter to this economic zone (sixth largest in manufactured goods) and its seventh largest importer.[6] So our inferences are based on a large, diversified economy that is relevant for global trade, exporting overwhelmingly manufactured goods.

Second, the particular way in which Turkish regulators implemented Basel 2 starting with July 1, 2012 helps us identify its effects on CLC-based trade transactions. When applying the credit risk component (Pillar 1) of Basel 2, the Turkish banking authorities required that all banks under their jurisdiction only use the SA, whose constituents are public information.[7] In contrast, banking regulators in other countries typically allow their banks to choose among the three different approaches when implementing Basel 2: (i) the SA, (ii) the "foundation version" of the Internal Rating Based (FIRB) approach, and (iii) the "advanced version" of the IRB (AIRB). FIRB and AIRB approaches, typically chosen by large and more sophisticated financial institutions that are also more

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[2] In fact, under Basel 2's SA, the Bank for International Settlements (BIS) provides local banking authorities with two alternatives for risk-weights for the foreign bank liabilities held by domestic banks. The Turkish Banking Regulation and Supervision Agency [Bankacilik Düzenleme ve Denetleme Kurumu, (BDDK)] opted for the second alternative that is briefly described here and in more detail in Section 3.1 below.

[3] A slightly different risk-weight scheme applies to CLCs with maturities less than three months (please refer to Section 3.1 for more detail).

[4] In fact, banks also need to set aside capital for CLCs that they *issue* for their Turkish importer clients. Under SA in Basel 2, it is the risk of the Turkish importer (the bank's counterparty in this case) that should be taken into account. Because Turkish rating agencies are not well established, Turkish banking authorities have allowed banks to treat all importers as *non-rated*, hence with no observable differential change in risk-weights, with the passage from Basel 1 to Basel 2.

[5] These rankings treat the E.U. as a single economy consisting of 27 member-country economies. Ranking based on the size of the economy according to the 2012 estimates of the International Monetary Fund (IMF). Rankings based on trade according to the 2011 estimates of the World Trade Organization (WTO).

[6] E.U.-Turkish customs union does not cover agriculture or the services sector.

[7] Turkish banking authorities made it clear that the Internal Rating Based (IRB) approach would eventually be introduced. But, as of July 2013 no Turkish bank was allowed to use the IRB approach.

likely to provide international trade financing services, may differ across institutions in the capital charges that they imply for a given on- or off-balance sheet position, such as a CLC (see, for example, Financial Times, February 26, 2013).[8] More importantly, when banks are allowed to adopt different approaches, identifying the effects of Basel 2 on international trade becomes more difficult, if not impossible, unless one has access to bank-and-firm level trade transaction or CLC data, which are typically proprietary and not commonly available to researchers. In contrast, the imposition of SA, whose components are public information, by the Turkish banking regulators to all banks under their jurisdiction provides us with a clear identification scheme for testing for the effects of Basel 2 on exports.[9]

Third, we work with a dataset, collected by the Ministry of Customs and Commerce, that covers the totality of Turkish foreign trade in manufactured goods between July 1, 2011 and June 30, 2013. Importantly, our data provide exports by trade aggregated by finance terms (whether based on CIA, CLC, or OA transactions), country of destination and two-digit ISIC industry level. This detail, which is typically unobservable in trade data, allows us to conduct our tests while controlling for unobservable country and industry characteristics.

To test for the potential impact of Basel 2 adoption on exports, we nest a difference-in-differences model into a gravity equation, which is the typical estimation tool of modern empirical studies in international trade. To control for time-varying country demand for foreign manufactured goods, our regressions incorporate destination-country imports for the period (excluding Turkish exports to that country) from the rest of the world. We also include distance between Turkey and the destination country as well as an indicator variable for adjacent countries to account for time invariant impediments to trade (the so-called iceberg costs). We use different estimation techniques to deal with the possibility that zero trade observations might bias our estimates. Our regression models explicitly account for different types of trade financing (CLC, but also CIA and OA) to provide the proper counterfactual encompassing all Turkish exports in manufactured goods. Our tests are inherently weak and potentially biased against us finding an effect as they rely on the joint hypothesis that: (i) ratings of foreign banks that issue the CLCs (sent to Turkish exporters) are no worse than that of their country of domiciliation, (ii) most of these export-related letters of credit are processed and held by Turkish banks, (iii) these financial institutions reflect Basel 2-related differential changes in capital charges to the prices of CLC clearing, and (iv) the Turkish exports are elastic to changes in CLC-financing related costs. These points are explained in more detail in Section 3 below.

[8] Claessens and Embrechts (2003) suggest that this may be less of a concern when comparing bank-specific IRB sovereign ratings with those of rating agencies. However, it is not clear that their findings from a single bank can be generalized to different banks in many countries.

[9] Given the quarterly country-industry level exports data at our disposal, we cannot test whether the treatment of small and medium sized enterprise (SME) counterparties under FIRB or AIRB approaches within Basel 2 may be affecting international trade (as in ICC report, March 31, 2009, p.40 and Financial Times, February 19, 2009). At any rate, such concerns do not apply to Turkish exports around Basel 2 implementation due to the mandatory nature of SA in Turkey during the period we study.

Our findings suggest that, after the mandatory adoption of Basel 2 in its SA version by all Turkish banks, and relative to the base-case below-investment category for which the costs of CLC clearing did not change, the value of CLC-settled Turkish exports to highest-investment rating category countries (for which CLC capital charges decreased by 80%) increased by 65.5%, to lower-investment rating category (for which CLC capital charges decreased by 50%; this group also contains non-rated countries accordingly with Basel 2 guidelines) by 43.4%. In contrast, we do not observe similar patterns for exports settled under other methods of payment (i.e., cash-in-advance or open account). We calculate the elasticity of CLC-intermediated exports to the changes in the bank's cost of capital to be between -0.74 and -0.87, suggesting that the reaction of trade values to changes in the cost of trade finance was economically relevant and strong. These results are robust to the presence of zero-trade observations, frequency of the data (annual or quarterly), various sub-samples, and a placebo test.

Our paper proceeds as follows. Section 2 provides a survey of the academic research that is relevant for our work. In Section 3 (i) we detail our identification scheme, (ii) introduce the empirical specifications that we use in our analysis, and (iii) provide information and summary statistics on our data. Section 4 presents our main empirical results, which are followed by robustness checks in Section 5. Section 6 concludes the paper.

2. Literature Review

Our paper draws upon, and contributes to, three strands of research. The first of these examines the impact of Basel Accord capital requirements on banks' lending behavior and the real economy. Most of the papers in this area of research examine the impact of capital requirements on banks' loan provision. Peek and Rosengren (1995a and 1995b) show that New England banks that are subjected to a "capital crunch" (shortage of capital under higher capital ratios, which need not equal RBC requirements) decrease their lending more. However, Berger and Udell (1994) use a larger panel dataset, control for alternative explanations, and find little evidence that the RBC requirements that U.S. regulators imposed during the early 1990s explain the credit crunch that followed. Kashyap and Stein (2004) show that simulated capital charges, and hence the lending costs, increase under Basel 2 compared to Basel 1. Berger (2006) examines the potential impact of AIRB adoptions on SME loans, and concludes that the economic effect is likely to be unimportant as small banking organizations are unlikely to adopt AIRB and the larger institutions that do so are much less likely to make typical SME loans. On the investments side Liebig et al. (2007) find that German banks' sovereign lending to emerging economies is little affected by RBC requirements after Basel 2 adoption. All of the above papers focus on the supply of loans by banks and do not directly test for the effects of capital requirements on the real sector.

One exception is Brun, Fraisse and Thesmar (2013) who use matched bank-and-firm loan-level French data to assess the impact of Basel 2 adoption in 2008 on bank lending as well as corporate activity. Using supervisory data and exploiting multiple bank-firm relationships these authors are able to control for unobservable bank heterogeneity as well as unobservable changes in firm credit demand. Moreover, having access to supervisory data, Brun, Fraisse and Thesmar (2013) are able to account for banks' adoption of SA, IRB or AIRB approaches and their internal credit risk assessments. They find that following the 2008 Basel 2 adoption the borrowing by French firms increased by 1.5%, investment by 0.5%, leading to the preservation 1% of aggregate employment during the crisis period. Our findings complement Brun, Fraisse and Thesmar (2013) by providing additional evidence that Basel 2 adoption affects the real sector through another channel, i.e., through its impact on trade flows.

Second, our work is also related with the recent and important research that examines the role of financial intermediaries in international trade. One strand of literature in this area examines the role of banking integration on trade. Michalski and Ors (2012) find that trade flows between US state-pairs grow as financial integration across-state borders increases following deregulations of interstate banking entry restrictions. In follow up work, Michalski and Ors (2013) find that entry by domestic banks with international assets as a US state becomes more financially integrated with the rest of that country leads to higher state-level exports to foreign destinations. In a related paper Hale et al. (2013) find that international trade increases as new international banking links, as proxied by international syndicated loans, are established. Another series of papers examine the impact of shocks to banks on international trade. For example, Ronci (2004) shows that a fall in trade financing following a domestic banking crisis leads to lower exports. Amiti and Weinstein (2011) find that one third of the drop in the trade-to-GDP ratio for Japan in the 1990s can be explained by the poor financial health of the main banks of the large Japanese exporters. Focusing on exports by small US firms during the latest downturn, Peek (2013) finds that export share of SMEs decreases with deteriorating bank financial health. Using export transactions data, Paravisini et al. (2013) show that the negative credit supply shocks experienced by Peruvian banks during the 2008 financial crisis account for a 15% drop in the exports of that country in the same period. Another strand of literature in this larger area examines the impact of credit constraints on exports. Chaney (2013) provides a model with liquidity-constrained exporters. Relying on a survey of Italian firms, Minetti and Zhu (2011) use the differences in historical Italian banking regulations as an instrument and find that firm-level exports are negatively affected by credit constraints. According to Chor and Manova (2012) external-finance dependent sectors in countries with adverse credit conditions experienced larger falls in their exports to the US during the 2008 crisis. That said, Levchenko et al. (2010) and Eaton et al. (2011) suggest that the drop in trade finance played a minor role during the trade collapse of 2008–2009, with the steep decline in trade-to-GDP ratio being linked with the lack of demand for intermediate or durable goods during the crisis. We complement this second research area by examining the effects of a regulatory change that may differentially affect the banks pricing of CLC clearing, which in turn might affect exporters' behavior when serving different destination countries.

Finally, our paper contributes to a recently emerging area of research that examines the role of different methods of payment in international trade, on which little is known. A number of papers in this line of research focus on one type of payment at a time. Mateut (2012) finds that cash in advance payments, which can be linked with both firm and industry characteristics, can be used to reduce default risk in international trade. Glady and Potin (2011) develop a model and find empirical evidence for the fact that asymmetric information and difficulties in contract enforcement increase CLC default risk, which financial intermediaries are able to reduce. Auboin and Engemann (201X) find that 1% increase in trade credit for a given country leads to a 0.4% increase in its real imports. Other papers try to characterize trade-off that might be involved across different international trade payment terms. Schmidt-Eisenlohr (2013) formulates a model that links trade financing terms (CIA, CLC or OA) to the characteristics of the importer and the exporter's respective financial markets and contracting environments. Antras and Foley (2013) characterize export transactions data from a large US poultry firm and rationalize the empirical patterns that they observe in an extension of the model developed by Schmidt-Eisenlohr (2013). While we cannot directly examine trade finance choices, as Antras and Foley (2013) do, due to the aggregate (at the country-industry) level of the data, we nevertheless allow for changes (around Basel 2 adoption) in CIA or OA-financed trade flows to the same risk-weight category destinations. As a result (i) we can account for changes in trade flows in a comprehensive way, and (ii) we can provide weak tests as to whether changes in the (implicit) cost of CLC affect shipments based on other payment terms. These points are made explained in the next section in which we detail our identification scheme, the empirical specifications that we use, and the data that are at our disposal.

3. Identification, empirical specifications, and the data

3.1. Identification

Our identification scheme relies on the Basel 2 induced changes in the capital charges for export-related CLCs that are confirmed and held by Turkish banks. Under the Basel Accords, a particular CLC issued by a foreign bank for its importer client or held by a domestic bank for its exporter client generates off-balance sheet positions for both banks. Under the SA version of Basel 2, a CLC, as any other off-balance sheet item, is first converted into an on-balance sheet credit-equivalent. For a CLC the conversion factor used for this purpose is 0.20 (i.e., 20%) under both Basel 1 and 2. For risk-weighted capital requirement calculations, this credit-equivalent amount is then multiplied by a risk-weight, which differs for different classes of (on- or off-) balance sheet risk exposures. Under Basel 1, the risk-weight for an international trade related CLC was 1.00 (i.e., 100%) irrespective of the counterparty risk involved.

In contrast, under Basel 2's SA the risk-weights applied to the trade-related CLCs vary depending on the counterparty risk, which is in this case the risk of a foreign importer's bank whose off-balance sheet liability (CLC) is held by the Turkish bank as an off-balance sheet asset.

Importantly, under the SA the counterparty risk is accounted for in the same way by all the Turkish banks using the same risk-weights: using independent rating agency ratings (such as Moody's, S&P or Fitch's) given to the foreign bank.[10] As a result, after July 1, 2012 for foreign bank liabilities (including CLCs) with original maturities higher than three months, the said risk-weight (i) was lowered to 0.20 for counterparty rating between Aaa and Aa3 by Moody's, (ii) reduced to 0.50 for counterparty rating between A1 and A3, (iii) remained 1.00 for counterparty rating between Ba1 and B3, and (iv) was increased to 1.50 for counterparty rating Caa1 and below.[11] Under the so-called Alternative-2 for foreign bank liabilities (including CLCs) with maturities shorter than three months another set of (similar) risk-weights are applied (please refer to Table 1 and Section 3.2 below). In either case, for a shipment sent from Turkey for which the importer asked its foreign bank to issue a CLC to the Turkish exporter, the related counterparty rating is that of the foreign bank that issued the letter. Importantly, this rating cannot be better than the long-term foreign-currency denominated sovereign rating of the country in which the counterparty is domiciled.

Our identification scheme may be better understood through a simple example. Prior to July 1, 2012, under Basel 1, holding an export-related CLC of $ 1 million (approximately equal to 1.8 million Turkish Liras [TL] on July 2, 2012), which would mature in more than 3-months, would have cost the Turkish bank $ 16,000 (approximately TL 29,000) in capital requirements, *irrespective* of the risk of the counterparty-bank issuing the CLC.[12] After July 1, 2012, under Basel 2, if the same foreign counterparty bank or the country of its domiciliation are rated between Aaa and Aa3 according to Moody's (AAA and AA- according to S&P or Fitch), then the related CLC would have cost the bank $ 3,200, that is, 80% cheaper compared to Basel 1. If the counterparty rating were to be between A3 and A1 according to Moody's (A+ and BBB- according to S&P or Fitch), the above-mentioned CLC would have cost the bank $ 8,000; that is, 50% cheaper compared to its Basel 1 level. Under Basel 2, the same capital charge of $ 8,000 would also apply if the counterparty or its country of domiciliation were to be *unrated*. This asymmetric treatment of unrated counterparties is understood to be a crude adjustment to shield (small) emerging economies from the potentially negative effects of RBC standards' on international trade. In contrast, if the counterparty bank has a (non-investment grade) rating between Ba1 and B3 according to Moody's (BB+ and B- according to S&P or Fitch), the risk-weight would remain at 1.00 (i.e., 100%), so the capital charge would remain the same ($ 16,000). Finally, the corresponding capital charge would increase by 50%, to $ 24,000, for the highest-risk

[10] In fact, Basel 2 provided domestic banking authorities with two alternatives for the calculation of the risk-weights for (on and off balance sheet) foreign bank liabilities. The Turkish banking regulator, BDDK, opted for the second alternative that we describe in the text (BDDK, July 2007, p. 10). The first alternative consists of applying the following (S&P or Fitch's) risk-weights: 0.20 for AAA and AA, 0.50 for A, 1.00 for BBB through B and for non-rated counterparties, and 1.50 for CCC and below (BDDK, July 2007, p. 9).

[11] These are (long-term) Moody's ratings as mandated by Basel 2. The corresponding Fitch or S&P ratings ranges are (i) AAA/AA-, (ii) A+/BBB-, (iii) BB+/B-, and (iv) CCC+ and below, respectively.

[12] $ 16,000 = $ 1,000,000×0.20×1.00 × 0.08, with 0.08 being the minimum Tier 1+2 capital requirement.

counterparties rated Caa1 and below according to Moody's (CCC+ and below according to S&P or Fitch).

While we have a clear identification scheme, which is well specified at a given point in time (i.e., Basel 2 adoption date of July 1, 2012) and across export-destination country groups (due to different rating groups being differently affected), changes to risk-weights need not affect trade transactions. First, Turkish banks need not fully reflect Basel 2 related changes to capital charges onto their prices for CLC-clearing. Although bankers that we spoke to indicated that the prices of CLC-related services were affected by Basel 2 adoption, Turkish banks may have done so only partially. This is because Turkish financial institutions, unlike their EU or US counterparts during the same period, were well capitalized as of June 2012. Their risk-weighted Tier 1 plus Tier 2 capital ratio was more than twice the amount required by Basel 2: 16.47% as of July 1, 2012, 17.88% by the year-end 2012). If Turkish banks internalized the capital cost charges resulting from Basel 2 adoption (to their benefit in those cases when capital charges decreased and to their clients' benefit when the implicit costs increased) we would be less likely to detect any changes in the related trade flows.

Second, Turkish firms' exports may have a low CLC-clearing-price elasticity (under the assumption that the banks would reflect most, if not all, of the Basel 2-related changes in costs of treating CLCs to their exporter-customers). In fact, Turkish firms' exports may be inelastic with respect to bank-charged prices for treating an export-related CLC because such prices, depicted above for a fictional transaction of $ 1 million, are relatively small for large trade transactions.

Our tests are further weakened by data at our disposal. First, the aggregated country-industry exports flows that we use do not allow us to trace the risk of the foreign counterparty, i.e., we do not know the identities of the foreign banks that have issued the CLCs that are held by the Turkish exporters' domestic banks. Instead we use the long-term sovereign debt (denominated in foreign currency) ratings as mandated by the SA version of Basel 2 as a proxy for the average counterparty foreign-bank risk rating. As such, we assume that the average counterparty-bank risk is highly correlated with that of the export-destination country. That said, some of the variation that we would like to capture ideally for a more precise test is lost.

Second, even though the data at our disposal account for all CLC-based trade transactions, Turkish banks may not retain all of the related CLCs on their books. It could be the case that exporter firm is left to hold the letter of credit. Alternatively, the Turkish bank may securitize the CLC by turning it into a banker's acceptance, even though such transactions are not very common in Turkey. Unfortunately, we do not know the fraction CLCs generated through export transactions that are held by Turkish banks. This means that, not all CLC-financed exports that we observe in the aggregate data would be affected by the changes to risk-weights under the standard approach in Basel 2. In other words, our tests are constructed as if all CLC-based exports are impacted by changes induced by Basel 2 adoption, when in reality only an unknown fraction of exports are directly affected.

Third, we do not know the average maturities of CLCs involved in Turkish exports. This further weakens our tests because under Basel 2's SA, the risk-weights (hence capital requirements) per rating category differ depending on whether the CLC has less than three months of maturity or higher. Our basic regressions presume that all CLCs have maturities higher than three months as international surveys suggest that they may be higher than 90 days on average. For example, a 2011 ICC report indicates that, based on a dataset of more than 11.4 million transactions over 2005-2010, the unweighted average "life-cycle" (i.e., maturity) of confirmed export-CLCs (including both CLCs requiring on-sight as well as deferred payments) was 103 days (International Chamber of Commerce, 26 October, 2011, p. 16). The comparable statistic for import-CLCs was 98 days. Since we have no information on the maturity of trade-related CLCs for Turkey, we conduct our regressions using the risk-weights for CLCs with maturities less than three months as well. The true impact of Basel 2 adoption is likely to be a combination of the two sets of risk-weights given the CLC maturities, which we cannot observe. As a result, when interpreting our results one should keep in mind that our tests are inherently weak and tilted against us finding any effect for the reasons described above.

3.2. Empirical specifications

3.2.1. Log-linear models

To conduct our analysis we estimate an empirical gravity equation in which we embed a difference-in-differences model. The gravity equation relates Turkish exports with a set of predictors commonly used in the empirical research on international trade. The difference-in-differences model allows us to test whether Basel 2 induced risk-weight changes across different groups of rating classes had any impact on exports to the corresponding groups of destination countries.

We start with a log-linear model to describe our empirical strategy. Even though log-linear gravity models suffer from a series of weaknesses (detailed in Section 3.2.2 below), we nevertheless rely on them (before moving on to our preferred models) as they provide a simple benchmark that is easy to describe. Our starting point is the following log-linear empirical gravity equation:

$$ln(EXPORTS\_CLC_{c,i,t}) = \alpha_0 + \alpha_1 \, ln(IMPORTS\_EX\_TUR_{c,i,t}) + \alpha_2 \, ln(DISTANCE_c) + \alpha_3 \, D\_ADJACENT_c + \delta_i + \varepsilon_{c,i,t} \quad (1)$$

where, subscript c denotes destination country, subscript i denotes two-digit industry segment, subscript t denotes time period, and prefix $D\_$ denotes indicator variables; $\ln(EXPORTS\_CLC_{c,i,t})$, the dependent variable, is the natural logarithm of Turkish CLC-based exports (in US dollars) to country c in industry sector i during period t; $ln(IMPORTS\_EX\_TUR_{c,i,t})$ is the natural logarithm of aggregate imports to country c in during period t after excluding of Turkish exports to that country, which controls for the destination-country import-demand; $ln(DISTANCE_c)$ is the geographical distance between Turkey and country c; $D\_ADJACENT_c$ is an indicator variable that is equal to one if country

c has a land-border with Turkey, and zero otherwise; δ_i is an industry fixed effect; and $\varepsilon_{c,i,t}$ is the regression error term. In eq. (2) coefficients α_1 and α_2 are elasticities that correspond to continuous variables $ln(EXPORTS\_CLC_{c,i,t})$ and $ln(DISTANCE_c)$. In contrast, the interpretation of the coefficient α_3 for the indicator variable requires that we calculate the related incidence ratio (exp(α_3) – 1).

Next, we embed a difference-in-differences model into eq. (1), based on the assumption that all export-related CLCs have maturities higher than three months. Nesting the difference-in-differences model into eq. (1), we obtain:

$$\begin{aligned} ln(EXPORTS\_CLC_{c,i,t}) = \alpha_0 &+ \alpha_1\, ln(IMPORTS\_EX\_TUR_{c,i,t}) + \alpha_2\, ln(DISTANCE_c) + \alpha_3\, D\_ADJACENT_c \\ &+ \beta_1\, D\_Aaa\text{-}Aa3_c + \beta_2\, D\_A1\text{-}Baa3\&NR_c + \beta_3\, D\_BASEL2_t \\ &+ (\beta_4\, D\_Aaa\text{-}Aa3_c + \beta_5\, D\_A1\text{-}Baa3\&NR_c) \times D\_BASEL2_t + \delta_i + \varepsilon_{c,i,t} \qquad (2) \end{aligned}$$

where, $D\_Aaa\text{-}Aa3_c$ is equal to one if destination country c has a rating of Aaa through Aa3 (which corresponds to a new risk-weight of 20% under Basel 2) according to Moody's (AAA to AA- according to S&P or Fitch) throughout the sample period, and zero otherwise; $D\_A1\text{-}Baa3\_\&\_NR_c$ is equal to one if destination country c has a rating between A1 and Baa3 or is not rated by any of the three rating agencies between July 2011 and March 2013 (for which the new Basel 2 risk-weight is 50%), and zero otherwise; D_BASEL2_t is equal to one for the period(s) following Basel 2 adoption on July 1, 2012, and zero otherwise; with the remaining variables being as described previously. In order to be able to estimate proper difference-in-differences models (in which the risk-weight group-level unobservables are captured by the same set of constants) we require that export-destination countries in our sample belong to the same rating category for a given the risk-weight between July 1, 2011 and Jun 30, 2013. Put differently, we keep countries in our sample so long as changes in their long-term sovereign debt ratings do not move them from one risk-weight category into another. For example, Greece is excluded from the sample because during our sample period it is upgraded from default category (for which the risk-weight is 150% if we consider CLCs with maturities higher than 90 days) to speculative grade (for which the risk weight is 100%). As a result of this restriction, the indicator variables that correspond to different risk-weight categories have only a country subscript. The omitted category (i.e., the base case) of ratings is Ba1 through B3 according to Moody's (BB+ through B- according to S&P or Fitch) for which the risk-weight is at 100% under bother Basel 1 and 2. It should be noted that rating categories below B3 according to Moody's (B- according to S&P and Fitch) corresponding to (impending or realized) sovereign default are excluded from the model because the only country that kept this rating in the data during the studied time period, Cuba, is a highly marginal destination for Turkish exports.

The coefficient estimates of interest are β_1 through β_5 or a combination thereof. Since these coefficients all correspond to indicator variables or such variables' interactions, our interpretation of their impact requires calculation of incidence ratios as described above. Coefficient estimates β_1 (β_2)

measures pre-Basel 2 difference, if any, in CLC-based exports for the group of ("treated") countries for which risk-weight has eventually decreased by 80% (50%) after adoption. Coefficient estimate β_3 measures the change in CLC-based exports post-Basel 2 for the base-case ("placebo") countries for which the risk-weight remains constant at 100% throughout the sample. Coefficient β_4 (β_5) is an estimate of the post-Basel 2 change in CLC-based exports with respect to the base-case category, for the countries for which CLC related capital charges became 80% (50%) cheaper with respect to the "placebo" group of countries for which the risk-weight remains at 100% after adoption. To find whether the 80% decrease in risk-weights (from 100% before Basel 2 to 20% after adoption) for the group of financial counterparties for which the rating is between Aaa and Aa3 had any impact on exports *with respect to their pre-Basel 2 levels*, we would have to test whether H_0: $\beta_3 + \beta_4 > 0$. Similarly, to test whether exports has increased A1 to Baa3 or non-rated countries, *with respect to their pre-Basel 2 levels,* following of a 50% decrease in risk-weights (from 100% before Basel 2 to 50% after adoption), we test H_0: $\beta_3 + \beta_5 > 0$.

Of course, besides CLCs, trade financing payment terms also include open account (where the exporter gets paid upon receipt of goods and bears the transaction's risk) and cash in advance (where the importer pays in advance and bears the transaction's risk). Since CLC-based exports correspond to roughly one-tenth of Turkey's exports, by excluding OA and CIA transactions we would not be estimating a proper gravity equation for Turkey's exports. Put differently, eq. (2) estimates might be biased, hence our economic inferences wrong, because we leave out almost 90% of Turkish shipments to countries that remain in our sample. As a result, we also estimate a triple-differences model after modifying eq. (2) as follows:

$$\begin{aligned}
ln(EXPORTS_{c,i,t}) = {} & \alpha_0 + \alpha_1\, ln(IMPORTS_EX_TUR_{c,i,t}) + \alpha_2\, ln(DISTANCE_c) + \alpha_3\, D_ADJACENT_c \\
& + \gamma_1\, D_Aaa\text{-}Aa3_c + \gamma_2\, D_A1\text{-}Baa3\&NR_c + \gamma_3\, D_BASEL2_t + (\gamma_4\, D_Aaa\text{-}Aa3_c + \gamma_5\, D_A1\text{-}Baa3\&NR_c) \times D_BASEL2_t \\
& + [\beta_1\, D_Aaa\text{-}Aa3_c + \beta_2\, D_A1\text{-}Baa3\&NR_c + \beta_3\, D_BASEL2_t + (\beta_4\, D_Aaa\text{-}Aa3_c + \beta_5\, D_A1\text{-}Baa3\&NR_c) \times D_BASEL2_t] \times D_LC_{c,i,t} \\
& + [\lambda_1\, D_Aaa\text{-}Aa3_c + \lambda_2\, D_A1\text{-}Baa3\&NR_c + \lambda_3\, D_BASEL2_t + (\lambda_4\, D_Aaa\text{-}Aa3_c + \lambda_5\, D_A1\text{-}Baa3\&NR_c) \times D_BASEL2_t] \times D_CIA_{c,i,t} \\
& + \delta_i + \varepsilon_{c,i,t} \qquad (3)
\end{aligned}$$

where, $ln(EXPORTS_{c,i,t})$ is the natural logarithm of the dollar value of exports from Turkey to destination country *c* in industry i for period *t*, which can be financed through OA, CLC or CIA; with all the other variables defined as above, but with the addition of $D\_CLC_{c,,i,t}$ ($D\_CIA_{c,i,t}$,) which is an indicator variable that is equal to one for exports financed through CLC (CIA), and zero otherwise. In this specification the open account (OA) transactions form the base case (as this is the most often used method of payment in Turkish exports). In this linear triple-differences specification eq. (3) we account for the totality of Turkey's shipments of manufactured goods to countries in our sample under different settlement terms. It should be noted that, despite the addition of OA- and CIA-based exports, the interpretations of the coefficient estimates of interest, namely β_1 through β_5, remains the same in eq. (3). In the next section we describe the weaknesses that plague log-linear gravity equation models and describe the alternative Poisson Pseudo-Maximum Likelihood (PPML) estimator.

3.2.2. Poisson Pseudo Maximum Likelihood regression models

As it is the case with most trade datasets, our data contains many zero export transactions. In other words, Turkey does not export in all periods in all industries to all the countries with which it trades using all three types of trade finance methods (i.e., OA, CIA, and CLC). Using a cross-sectional international trade dataset Santos-Silva and Tenreyro (2006) show that log-linear gravity models are biased and potentially inconsistent due to heteroskedasticity inherent in the trade data. Additionally, these models naturally drop zero-trade observations often occurring in trade data, something which further biases the results.[13] These authors suggest that Poisson or PPML estimators be used instead (see also Santos-Silva and Tenreyro, 2011). Recently, these models have been widely employed in the empirical international trade literature. The Poisson regression assumes that the data are not dispersed, i.e., that the ratio of the mean of the data to its standard deviation is close to one. We observe that this is not our case: the Turkish exports data are highly dispersed, in which case PPML provides a more flexible approach than Poisson regression by allowing the variance to be proportional to the mean of the data. As a result, to accommodate zero-exports and to obtain unbiased estimates for our gravity equation, we estimate the following PPML version of eq. (2):

$$\begin{aligned} EXPORTS\_CLC_{c,i,t} = exp \{ & \alpha_0 + \alpha_1 \ln(IMPORTS\_EX\_TUR_{c,i,t}) + \alpha_2 \ln(DISTANCE_c) + \alpha_3 D\_ADJACENT_c \\ & + \beta_1 D\_Aaa\text{-}Aa3_c + \beta_2 D\_A1\text{-}Baa3\&NR_c + \beta_3 D\_BASEL2_t \\ & + (\beta_4 D\_Aaa\text{-}Aa3_c + \beta_5 D\_A1\text{-}Baa3\&NR_c) \times D\_BASEL2_t + \delta_i \} + \varepsilon_{c,i,t} \end{aligned} \quad (4)$$

where *exp()* denotes the exponential function. We also estimate a PPML version of eq. (3), which allows us to account for the totality of Turkey's exports to countries in our sample between 2011Q3 and 2013Q2. In the next section we describe the data with which we estimate eq. (3) and (4).

3.3. Data

Our dataset was constructed from four different sources. Exports data are provided to us by the Turkish Statistical Institute. They are part of the all-comprehensive international trade data that are collected by the Turkish Ministry of Customs and Trade based on individual shipment documents that are filed electronically. The Turkish Statistical Institute provided us with aggregated quarterly data between July 1, 2011 and June 30, 2013 by country of destination, two-digit International Standard Industrial Classification (ISIC) category and by trade financing type (CIA, CLC and OA).

[13] One solution is to transform the dependent variable by adding $ 1 to all export flows and then take their natural logarithm, i.e., $\ln(1+EXPORTS_{c,t})$. However, Santos-Silva and Tenreyro (2006, 2011) also show that a gravity regression in which the dependent variable is transformed by adding one leads to even higher biases in the estimates.

We aggregate these quarterly data to come up with one year of pre- and one year of post-Basel 2 adoption exports data at the industry-country level. In other words, we aggregate 2011Q3- 2012Q2 country-industry data into a single pre-Basel 2 period. We do the same with the 2012Q3- 2013Q2 data to obtain post-Basel 2 period observations at the country-industry level. We do this aggregation in order to control for (i) seasonality effects that might otherwise be picked by the difference-in-differences model's time interactions and (ii) potential serial correlation in the error terms in the panel (Bertrand, Duflo, Mullanaithan, 2004)[14], but also (iii) to attenuate the problem of zero-trade observations. We restrict ourselves to shipments by the manufacturing sectors.. These exclude barter transactions and goods that are re-exported from special trade zones established within Turkish borders. We impose the following filters on these data. First, we exclude countries for which sovereign debt ratings changed in such a way that the country in question changed risk-weight category between July 1, 2011 and June 30, 2013 .[15] This restriction ensures that our difference-in-differences indicator variables correspond to the same country-industry groups by constant risk-weight category throughout our sample. Second, we exclude Cuba, which retains is Caa1 long-term foreign currency sovereign debt rating from Moody's during our sample period, because it is (i) the only country in the highest (150%) risk-weight category and (ii) a marginal destination for Turkish exports (hence with many zero-observations). Third, we also exclude Iran and Syria from our dataset. We drop Iran because, during the period of our study, Iran was subjected to an international embargo, which tilted this country's trade with Turkey in unusual ways towards gold (Financial Times, February 18, 2013). We also eliminate Syria, because that country's 2004 free trade agreement with Turkey that became effective on January 1, 2007 was suspended on December 6, 2011 (after the start of our sample) due to political differences over the handling of the Syrian civil unrest that turned into a civil war. As a result, 2012 bilateral trade between the two countries shrank by 74% down to $ 566 million compared to its 2011 level.

For a number of countries we have multiple agency ratings, in which case we follow the rules imposed by the Turkish banking regulators. If a country has two agency ratings, Turkish banks have to use the worst (lower) of the two ratings. If a country has three ratings, the banks are required to use the better of the worst two ratings (i.e., the middle rating). We follow the same rules in order to determine the agency rating of a country in a given quarter, and then drop all countries whose rating change(s) made it so that the country did not remain in a given risk-weight category between 2011Q3 and 2013Q2.

For destination country imports we use the quarterly IMF Direction of Trade Statistics (DOTS) imports data by country of origin between 2011Q3 and 2013Q2. For each destination country *c* we

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[14] The results with quarterly country-industry data or data aggregated at the country-level are quantitatively and qualitatively similar. These are not reported to conserve space but are available upon request from the authors.

[15] The following countries are excluded for this reason: Azerbaijan, Barbados, Belize, Benin, Chile, Croatia, Cyprus, Egypt, Greece, Grenada, Hungary, Indonesia, Ireland, Italy, Jamaica, Korea, Pakistan, Philippines, Portugal, Romania, Slovenia, Spain, Tunisia, Uruguay.

aggregate quarterly imports from all other countries after excluding shipments from Turkey. Then, we match the quarterly country-industry Turkish exports data with the quarterly IMF imports data before aggregating data into one pre- and one post-Basel 2 annual period. As a result of these restrictions we end up with exports to 153 countries along 22 ISIC industry sectors under three different methods of payments (CIA, CLC and OA) for eight quarters centered around July 1, 2012.

Distance data between the capital cities for Turkey and export destination countries are obtained from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) database. The indicator variable *D_ADJACENT* is coded as one for the five countries that have a land border with Turkey (which are Armenia, Bulgaria, Georgia, and Irak) and zero otherwise. Finally, independent agency (Moody's, S&P, and Fitch) ratings for long-term sovereign (foreign currency denominated) debt for countries in our sample are obtained from public sources, including http://countryeconomy.com/ratings.

The summary statistics are provided in Table 2. Our quarterly country-industry database contains 80,784 observations (= 153 countries × 22 ISIC industries × 3 payment terms × 8 quarters). The dependent variable, *EXPORTS*, has a mean of $ 10.38 million and a standard deviation of $ 80.81 million. The large standard deviation is typical in international trade studies: *EXPORTS* range from zero to $5,058.7 million, with a median of $ 47,346. In fact, we have no trade in approximately 33% of country-industry-year observations in the dataset. The large proportion of zero-trade country-industry-year observations, as it is typical in international trade studies, suggests that the log-linear regression model estimates may not account well of Turkey's export patterns.

The annual country-level imports excluding imports from Turkey (*IMPORTS_EX_TUR*) has a mean of $ 102.2 billion, with a standard deviation of $ 285.5 billion. The average *DISTANCE* between the capital cities of destination countries and Turkey is 5,904.4 kilometers.

When looking at the distribution of ratings groups in the *annual* data given the change in the risk-weights for CLCs with maturities higher than three months, we observe that 35.9% of the observations (including zero exports) belong to non-rated countries, 18.3% to countries whose ratings range from A1 to Baa3, 17% to destinations with ratings between Aaa to Aa3. A slightly different distribution is obtained when we consider the risk-weights for CLCs with maturities lower than three months. Non-rated and Aaa through Baa3 rated countries form the largest groups (35.9% and 35.3% of the observations, respectively), followed by Ba1 to B3 rated destinations (28.8%).

Before discussing the estimation results, we present some patterns in the data, which will help us in interpreting the model's estimates. Figure 1 shows that the share of CLC-financed exports ranges between 10% and 12% throughout the period. The figure is more than double of the one reported by Antras and Foley (2013) in their study of a large exporter of frozen poultry products in the US. In our data, bank financing (CLC) ranks the second after exporter-financing (OA) in terms of value. Thus the use of CLCs seems more prevalent than what is assumed in the existing literature.

There exists considerable heterogeneity in the use of CLCs across industries. In 2010, an out-of-sample year, the share of CLC-based exports had an average of 8.1% and a standard deviation of 10.6% across the 22 two-digit ISIC industries we consider. To illustrate, CLC-financed exports accounted for only 0.82% of exports in the manufacture of office, accounting and computing machinery, in contrast to 40.7% of exports in the manufacture basic metals. The example is consistent with the explanation provided by Antras and Foley (2013) for the small share of CLC-financed exports in the food industry: goods produced in the basic metal industry may be easier to collateralize than those produced in the manufacture of office, accounting and computing machinery. Thus we are more likely to see an effect of the Basel 2 implementation on the use of CLCs in industries that have always relied more on this sort of financing. In section 4, we will test whether such heterogeneity across industries exists.

As a first pass at understanding the effect of risk-based capital requirements under Basel 2 framework on Turkey's international trade, we aggregate exports by credit-rating categories and calculate the share of CLC-financed exports for each category before and after the implementation of Basel 2. Figure 2 shows a clear fall, about 5 percentage points, in the share of CLC-financed exports to countries for which the risk-weights remain at 100% in the post-Basel 2 period, and no such pattern is observed for CLC-financed exports to countries for which the risk-weights have decreased. The following section will provide a more thorough analysis of the data.

4. Results

4.1. Estimates with only CLC-based exports data

First we estimate the log-linear model of eq. (2) with aggregated country-industry level annual data around Basel 2 adoption. To guard against the possibility that gravity equation errors might be correlated across different ISIC industries for a given destination country, we cluster the standard errors at the country level in all of our regressions.

The results of the log-linear models with country-level data when we restrict ourselves to CLC-based exports are presented in the first two columns of Table 3. In these specifications the base category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. We first focus on the explanatory variables that are linked with the gravity equation model. In column (A) we observe that the coefficient estimate for ln(*IMPORTS_EX_TUR*) is equal to 0.530 and statistically significant at the 1%-level: as the aggregate import demand of the destination country increases by 1%, Turkey's industry-level exports to that country increases by 0.53%. The coefficient estimate for *ln(DISTANCE)* is equal to -0.629 and statistically significant at the 1%-level. These two coefficient estimates are lower than the typical log-linear gravity equation coefficients that are observed in the literature, which are near +1 for the logarithm of the destination country GDP and -1 for the logarithm of distance. Our estimates might differ because we do not estimate a full-blown gravity equation when we limit ourselves to Turkey's CLC-based transactions only. The coefficient estimate for *D_ADJACENT* (which only comprises Armenia, Bulgaria, Georgia, and Irak, as Azerbaijan, Greece, Iran and Syria are eliminated from the dataset) is equal to 0.125 but not statistically significant. This finding suggests that contiguity is not a good predictor of Turkish exports to these four countries relying on CLCs for settlement. This is somewhat expected from the existing literature on international trade payments: if goods do not travel for long distances, there is less risk involved in the transaction and a lower need for CLC-payments.

Next, we turn our attention to the difference-in-differences part of our empirical model. The coefficient estimate for *D_BASEL2* is equal to 0.0417, *D_Aaa-Aa3* to 0.0931, *D_A1-Baa3_&_NR* to 0.112, *D_Aaa-Aa3×D_BASEL2* to 0.187, *D_A1-Baa3_&_NR×D_BASEL2* to 0.192, none of which are statistically significant. The introduction of country fixed effects in column (B) does not materially change these results (except for the coefficient of ln(*IMPORTS_EX_TUR*) that becomes statistically insignificant). At a first glance these results might suggest that Basel 2 induced risk-weight changes have no impact on Turkey's CLC-based exports. But, as Santos Silva and Tenreyro (2006, 2011) show, log-linear models that do not take into account zero-trades and handle heteroskedasticity properly might yield biased and inconsistent gravity model estimates. Notably, for the CLC-based exports 3,668 observations out of 6,732 in our sample are zeros (54%). As a result, the omission of zero trades may be an important source bias for the OLS estimator.

In columns (C) and (D) of Table 3, we present the results of PPML estimates as suggested by Santos Silva and Tenreyro (2006, 2011). In column (C) the elasticity of destination country import demand (ln(*IMPORTS_EX_TUR*)) for CLC-based exports is equal to 0.381, which is statistically significant at the 1%-level: a 1% increase in import demand, increases CLC-based Turkish exports by 0.38%. The coefficient estimate of *ln(DISTANCE)* is equal to -0.293 but not statistically significant: after correcting for the bias introduced by zero-exports transactions, distance no longer affects Turkey's CLC-based exports. As in case of the log-linear model in the first column, the coefficient estimate for *D_ADJACENT* is positive but not statistically significant. The coefficient estimate for *D_BASEL2* is equal to -0.243 and statistically significant at the 10%-level: during the four quarters that follow July 1, 2012, the incidence ratio of exports to destination countries rated Ba1 to B3 by Moody's (BB+ to B- by S&P and Fitch), which form the base-case reference group, fell by 21.6% (= exp(-0.243) - 1) compared to these countries' shipments in the four quarters preceding pre-Basel 2 adoption. In column (C) The coefficient estimate for *D_Aaa-Aa3* is equal to 0.791 but not statistically significant: in the pre-Basel 2 period, with respect to the reference group of countries, exports to destinations rated between Aaa and Aa3 are not statistically higher. A similar finding holds for *D_A1-Baa3_&_NR*: its coefficient estimate in column (C) is equal to 0.515 but not statistically significant, indicating that prior to Basel 2 adoption there is no statistical difference for this group and the countries for which the risk-weights stay constant throughout our analysis. In column (C), the coefficient estimate of the interaction *D_Aaa-Aa3×D_BASEL2* is equal to 0.450 and statistically significant at the 10% level: post-Basel 2 adoption there is a 56.8% increase in the incidence of exports to Aaa through Aa3 rated countries, whose CLC risk-weight (hence, potentially the cost of CLC clearing) has decreased by 80% with respect to countries whose risk-weight remained constant at 100% after July 1, 2012. In a similar fashion, in column (C), the interaction *D_A1-Baa3_&_NR×D_BASEL2* has a coefficient estimate of 0.385 that is statistically significant at the 5%-level: compared to the base-case category, the incidence of exports to A1 through Baa3 rated countries plus the non-rated countries has increased by 47.0% when compared with the base-case countries during the four quarters that follow July 1, 2012.

An alternative way to look at these results is to ask the question whether post-Basel 2 exports for a given group of countries (for which the risk-weights have decreased by 80% or 50%) have increased with respect to the same category's exports pre-Basel 2. To be able to answer this question we conduct the test the null hypotheses H_0: *D_BASEL2+D_Aaa-Aa3×D_BASEL2*=0 and H_0: *D_BASEL2+D_A1-Baa3_&_NR×D_BASEL2*=0, and present the results at the bottom of Table 3. We find that *D_BASEL2+D_Aaa-Aa3×D_BASEL2* is equal to 0.207 and that *D_BASEL2+D_A1-Baa3_&_NR×D_BASEL2* is equal to 0.142 but neither of them is statistically significant. The coefficient estimate of *D_BASEL2* suggests that post-Basel 2 exports have unambiguously fallen for the Ba1 to B3 rated (base-case) countries. In contrast, investment grade (A1 to Baa3 rated) as well as non-rated countries, for which the decrease in the risk-weight made it relatively cheaper for Turkish banks to hold export-related CLCs as off-balance sheet items, were able to maintain their export levels post-Basel 2.

In column (D) of Table 3, we present the PPML estimates after including country fixed effects to absorb any country-level unobservables, over and above the already included industry fixed effects, which might otherwise affect our estimates. We find point estimates and test results that are very similar to those of column (C) with two exceptions. First, in the presence of country fixed effects the estimate of ln(*IMPORTS_EX_TUR*) is -0.0557, which is not statistically significant, suggesting that changes in the import demand of destination countries in the eight quarters that follow July 1, 2012 do not matter for CLC-based Turkish exports in the studied period.[16] Second, while *D_BASEL2* coefficient estimate of -0.223 in column (D) is very close to that in column (C), it is no longer statistically significant at the 10% level (but the p-value is 0.11). However, column (D) coefficient estimates of interest for the interactions *D_Aaa-Aa3×D_BASEL2* and *D_A1-Baa3_&_NR* are of the same sign, magnitude and statistical significance as their counterparts in column (C). The same holds for the results of the tests H_0: *D_BASEL2+D_Aaa-Aa3×D_BASEL2*, and H_0: *D_BASEL2+D_ A1-Baa3_&_NR×D_BASEL2* at the bottom of column (D). So our results are robust to the inclusion of country fixed effects.

[16] Because we have only two annual periods pre- and post-Basel 2 adoption, the inclusion of country fixed effects alters the interpretation of this coefficient radically in relation to its interpretation in column (C).

The estimates in Table 3 are based on CLC-based exports, which form roughly 10% of Turkey's shipments of manufactured goods to foreign destinations. In the next section we focus on the same coefficient estimates to test for the potential effects of Basel 2 adoption on CLC-based shipments after including into the estimation sample the remaining 90% of exports made using CIA or OA payment terms.[17]

4.2. Estimates with exports data with the three methods of payment

In Table 4 we present the estimates of eq. (3) in column (A). Estimates of the same model after adding country fixed effects are presented in column (B). As noted before, these log-linear models are potentially biased and inconsistent due to heteroskedasticity and the exclusion of zero export flows in certain industries. We do not discuss but nevertheless provide them as a reference point. The PPML estimates, which are the focus of our analysis, are presented in columns (C) and (D).

In Table 4 column (C) and (D), we first note that the coefficient estimates for *ln(IMPORTS_EX_TUR*), i.e., destination-country import-demand elasticity for Turkish exports, are 0.692 and 0.662, respectively, both of which are statistically significant. Taking into account different types of payment terms, Turkey's exports increase on average by almost 0.7% when destination country import demand increases by 1%. We also find that the coefficient estimate for ln(*DISTANCE*) is equal to -0.774 and statistically significant in column (C). Turkey's exports, when all three payment terms are accounted for, decrease on average as distance to the destination country increases. Moreover, the coefficient estimate of *D_ADJACENT*, which is equal to 1.419 and statistically significant. Given that Table 3 coefficient estimate for this variable was not statistically significant, we can deduce that Turkey trades more with the neighboring countries using CIA and OA payment terms. These coefficients, when compared to Table 3, suggest that the gravity equation model parameters become closer to those found in the empirical trade literature when we enlarge the sample to all three types of payment methods for exports.

In eq. (4), for which results are presented in Table 4, the reference category OA-based export shipments to Ba1 to B3 rated countries prior to Basel 2 adoption by Turkish banks. In column (C) the coefficient estimate *D_Aaa-Aa3* is equal to 0.761, which is statistically significant at the 5%-level, and implies that the incidence of shipments to Aaa to Aa3 rated countries is 114% higher compared to the Ba1 to B3 rated countries. This result suggests that when Turkish exporters take on the export-transaction risk, they ship more goods to highest investment grade countries, where counterparties are likely to be of higher quality and access to courts and arbitrage more likely to be more successful. We also find a similar result (82% higher incidence of shipments) for *D_ A1-Baa3_&_NR* (group of countries). In column (C), the coefficient estimate for *D_BASEL2* that captures the changes in exports

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[17] With the exception of (i) exports from special trade zones, (ii) re-exports of imported goods, and (iii) barter transactions.

paid through OA post-Basel 2 is equal to 0.0877, which is statistically significant at the 10%-level. The coefficient estimate for the same variable is equal to 0.0853 but not statistically significant in column (D) when we add country fixed effects (though the p-value is 0.106). The incidence of OA-based exports to Ba1 to B3 rated countries increase by roughly 9% after Basel 2 adoption, but the results are only marginally significant at best. We observe no change in OA-based exports to investment grade countries post-Basel 2: the coefficient estimates of *D_Aaa-Aa3×D_BASEL2* and *D_ A1-Baa3_&_NR×D_BASEL2* are negative and one cannot reject the hypothesis that *D_BASEL2+D_Aaa-Aa3×D_BASEL2* and *D_BASEL2+D_ A1-Baa3_&_NR×D_BASEL2* are zero. So, we observe no important change in OA-based exports post-Basel 2, a point we will come back to later.

Next, we turn our attention to CLC-based exports in column (C) of Table 4. Note that in columns (C) and (D), the coefficient estimates for *D_CLC* variable's interactions are very close if not equal to each other, suggesting that the specification in column (C) does a fairly good job in explaining country-industry level export flows relative to each other. Considering the (statistically significant) coefficient estimate of -1.331 for *D_CLC*, after calculating the incidence ratio of -0.736 (= $e^{-1.331}$–1) we infer that, in the pre-Basel 2 period and compared to open account transactions, the exports are 73.6% less likely to be associated with a CLC for the category of Ba1 to B3 rated countries (for which the risk-weight remains constant at 100% under both Basel 1 and 2). Prior to the adoption, when the risk weights are equal irrespective of counterparty (which translates here into country of shipment destination), there is no difference in CLC-based export flows across countries given their rating groupings: the coefficient estimates for *D_CLC×D_Aaa-Aa3* and *D_CLC×D_A1-Baa3_&_NR* are negative but not statistically significant. However, in the post-Basel 2 period the incidence of CLC-based exports to Ba1 to B3 rated countries decreases further by 28.8% (=$e^{-0.339}$-1), a result that is statistically significant at the 5%-level. In contrast, CLC-based exports to investment grade countries increase: The coefficient estimate for *D_CLC×D_Aaa-Aa3×D_BASEL2* (*D_CLC×D_A1-Baa3_&_NR×D_BASEL2*) is equal to statistically significant 0.504 (0.361), implying that, compared to CLC-based exports to the reference group of Ba1 to B3 rated countries, the incidence of CLC-exports increases by 65.5% (43.5%). We also compare the post-adoption CLC-based exports by category of country of destination with their pre-adoption levels. At the bottom of columns (C) and (D) the null hypothesis that *D_BASEL2 + D_Aaa-Aa3×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC×D_Aaa-Aa3×D_BASEL2* is equal to zero cannot be rejected. We find a similar result for the lower investment grade category: the null hypothesis that *D_BASEL2 + D_A1-Baa3_&_NR ×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC× D_A1-Baa3_&_NR ×D_BASEL2* is equal to zero cannot be rejected. These results suggest that when we take into account different types of payment methods for exports (in Table 4), we obtain results that are similar to those obtained in Table 3 in which we restrain ourselves to CLC-exports only. The post-Basel 2 decrease in Turkish banks' capital charges for CLCs issued by banks domiciled in investment grade countries appears to help maintain exports to these destinations (though without engendering any trade creation), whereas CLC-intermediated exports decrease to below-investment grade countries.

Examining coefficient estimates with *D_CIA* interactions, we observe no statistically significant change for CIA-financed exports across any of the country rating groups. It is possible that the decrease in CLC-based exports to Ba1 to B3 rated countries after adoption is substituted by an increase in exports intermediated by OA and CIA. If CLC-based exports to Ba1 to B3 rated countries become relatively more expensive (or less available for example because of credit rationing) after Basel 2 adoption, Turkish exporters might on average require better (or more secure) payment terms from their importer clients when the conditions permit. On the other hand, some financially unconstrained exporters might start providing trade credit to their counterparties, in line with the findings of the trade credit literature as Calomiris et al. (1995), Choi and Kim (2005) or Love et al. (2007). Exporters that are active in many markets may use the cost savings on CLC-contracts to investment-grade countries to expand business and offer trade credit on export transactions to Ba1 to B3 rated countries. Ideally, one would use transactions data to test whether such switches occurred after Basel 2 adoption between the same exporter and importer pairs. Unfortunately, we are constrained to work with aggregated exports data. As a result, we presume that exporters might request cheaper payment terms (for example, by shifting the risk of the transaction on the importer by a CIA payment) if they have the bargaining power. At the aggregate level such a behavior is more likely to occur if Turkey's risk rating is higher than the rating of the country where the importers are domiciled. Knowing that post-Basel 2 adoption Turkey had either a "high" non-investment grade rating or the lowest investment grade rating, we test whether CIA-based exports to Ba1 to B3 rated destinations have increased.[18] Using estimates from column (D) in Table 4 we reject the null hypothesis that *D_BASEL2* + *D_CIA*×*D_BASEL2* is zero at the 5% level. Using a very crude test with aggregate flows we conclude that there might be a switch from CLC-financing of trade flows to Ba1 to B3 rated countries after Basel adoption to CIA payment terms that are safer for Turkish exporters. As mentioned above, the positive coefficient on *D_BASEL2* that captures the changes in exports paid through OA post-Basel 2, even though marginally significant, may be indicative of a switch to OA-payment terms for some exporters. Our aggregate data do not permit us, however, to give a definite answer whether such switching between payment terms occurs – we may be capturing here for example a global increase in the demand for Turkish exports as well as inflation (the trade data is denominated in U.S. dollars) with CLC-trade dropping, We notice also that such substitution between payment terms does not appear in trade flows to investment grade countries.

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[18] Moody's rated Turkey's long-term, foreign currency denominated, debt as Ba2 between January 10, 2010 and June 19, 2012; Ba1 between June 20, 2012 and May 15, 2013; and Baa3 starting with May 16, 2013. S&P rated the country BB between February 19, 2010 and March 26, 2013, and upgraded it to BB+ on March 27, 2013. Fitch's ratings were BB+ between December 3, 2009 and February 25, 2013; and BBB- starting with February 26, 2013.

Finally in this section, we check whether we obtain similar results using risk-weights that apply to CLCs that have original maturities of less than three months. As explained above, we do not know the maturity of the CLCs used for exports in the data. This means that an unknown fraction of Turkish exports is settled through short-term CLCs (with a maturity of less than 90 days). Scarce surveys of international trade transactions do not resolve the question (the 2011 ICC report claims that the *average* maturity of a confirmed export CLC was 103 days) and the matter was, to the best of our knowledge, not investigated for Turkey. The risk-weights for shorter-term CLCs are somewhat different from those that apply to CLCs with original maturities longer three months (as shown in Table 1). For trade to all investment-grade countries (rated Aaa to Baa3 by Moody's, AAA to BBB- by S&P or Fitch) or those that are non-rated the attributed risk-weight becomes 0.20 while for countries rated Ba1 to B3 the risk weight for short-term CLCs is no longer constant but *falls* from 1 to 0.50. Therefore, for all countries that we take into account the cost of short-term CLC instruments falls after Basel 2 implementation.

As a result, we regroup the export destination countries accordingly. We create a new indicator variable for the investment grade and non-rated countries (*D_Aaa-Baa3_&_NR*) and re-estimate eq. (4) in its log-linear and PPML versions. Now, we have five additional countries whose investment-grade ratings category do not change throughout the eight quarters in our sample[19]: even though their ratings are up or downgraded, the move is not large enough for these five countries to cross the threshold for investment grade status or the one into default status. We show the results in Table 5 and focus on the Poisson models in columns (C) and (D) for the sake of brevity. Given all investment grade countries are now merged into one category given the short-term CLC risk-weights, coefficient estimates of variables such as *D_CLC × D_BASEL2* do not change much under the new specification compared to Table 4. In Table 5 columns (C) and (D) the coefficient estimate of *D_CLC×D_BASEL2* is equal to -0.339 (statistically significant at the 5%-level) and identical to the corresponding estimate in Table 4's columns (C) and (D): in both cases CLC-based exports to Ba3 to B3 rated countries decrease after Basel 2 adoption. The coefficient estimate of *D_CLC×D_Aaa-Baa3_&_NR×D_BASEL2* is equal to 0.466, indicating that compared to OA-based exports for Ba3 to B3 rated countries, CLC-based shipments' incidence ratio increased by 59.4% after Basel 2 adoption. Unsurprisingly, this coefficient estimate lies in between the ones obtained in Table 4 column (C) when the investment grade countries were separated into two groups because of the long-term risk-weights. In Table 5 (as in Table 4) the overall effect of Basel 2 adoption on CLC-intermediated trade is still not significantly different from zero: the test for the equality of *D_BASEL2+D_Aaa-Baa3_&_NR×D_BASEL2+D_CLC×D_BASEL2+D_CLC×D_Aaa-Baa3_&_NR×D_BASEL2)* cannot be rejected.[20]

[19] These countries are Chile, Italy, Slovenia, South Korea, and Spain.
[20] The p-values for the rejection of the null are 10.2% and 14.3% in columns (C) and (D) respectively.

4.3. Robustness checks

In Tables 6 through 11 we present a series of robustness checks. In these we assume country groupings according to risk-weights presuming that the CLCs have on average longer than three months of original maturity. In the robustness checks we present only PPML estimates of eq. (4) due to the aforementioned shortcomings of the log-linear models.

In Table 6 we split Turkey's manufacturing industries into two groups accordingly to their usage of CLCs in exports (below and above the median) in 2010, a year that precedes our sample period. We observe that there is a great heterogeneity in the reliance on CLC as a payment term (corresponding statistics are not reported to conserve space). The observed heterogeneity may be due to the practices in a particular industry segment, counterparty bank's risk-rating, the share of intra-firm trade (as inter-related counterparties should trade more on open account terms), and the characteristics of the destinations served. The median share of CLCs in total Turkish exports was 4.5%. The industry that used the letters of credit the most with a share of 40.7% of exports was "Manufacture of base metals" (ISIC 27). On the other extreme, for the "Manufacture of tobacco products" industry segment (ISIC 16), the share of CLC-settled transactions in total exports was 0%.[21] The overall export share of industries with a usage of CLCs higher than the median is 66.4% in our sample. In columns (A) and (B) of Table 6, confirming our expectations, the effects of Basel 2 on intermediated trade show up stronger in the industries that used CLCs more often. Compared to the base category of exports to Ba3 to B3 rated countries, the incidence of CLC-based exports to the highest-rated states increase in the post-Basel 2 period by 76.7% while those to the countries rated A1-Baa3 by 49.6% (both statistically significant at the 5% level). Both effects are stronger than those for the total sample as shown in Table 4. In columns (C) and (D) of Table 6, the estimates of *D_CLC × D_Aaa-Aa3 × D_BASEL2* and *D_CLC × D_A1-Baa3_&_NR × D_BASEL2* for the subsample of industries with the CLC usage below the median are negative but statistically not different from zero at the conventional levels of significance. Surprisingly, post-Basel 2, CLC-based exports in below-median CLC-usage industries to Ba3 to B3 rated countries increase when they are compared with their pre-Basel 2 levels: in columns (C) and (D) of Table 6, the coefficient estimate for *D_CLC×D_BASEL2* is equal to 0.248 (statistically significant at the 5%-level). WE HAVE NO GOOD EXPLANATION FOR THIS RESULT!! At the bottom of Table 6, we test whether CLC-based exports increase with respect to the same category of destination countries according to the associated risk-weights. We observe that it does for industries with below-median CLC usage, *D_BASEL2+D_Aaa-Baa3_&_NR×D_BASEL2+D_CLC×D_BASEL2+D_CLC×D_Aaa-Baa3_&_NR ×D_BASEL2* is equal to 0.211 to 0.242 and significant at the 5%-level.

In Tables 7-8 we give the estimates of the model with different subsamples of countries to see whether our results depend on a particular subset of destinations. The results shown here confirm the

[21] In our sample we have, however, some observations with CLC-intermediated trade in this industry.

patterns found in Table 4: the coefficient estimates in Tables 7 and 8 are very close to the ones obtained earlier. In columns (A) and (B) of Table 7 we show that estimates for countries that are also members of the World Trade Organization (WTO) as of beginning of 2011 (121 countries in our sample). WTO membership implies that the rules for setting manufacturing trade barriers (such as tariffs) and many procedures in trade relations (like disputes) are standardized. Hence the results are not driven by some outliers that are not WTO members. One could worry that the crisis in many EU (and especially Eurozone countries) occurring at the time of our policy experiment could be affecting our results. Hence, columns (C) and (D) of Table 7 present the results for the countries that are *not* members of the European Customs Union (EUCU) or EFTA.[22] In Table 8 we show respectively our results excluding small countries in terms of GDP – less than \$10bn in PPP terms in 2010 according to Penn World Tables 7.1 (columns (A) and (B)) – or small export destinations (in the lowest 25 percentile in our first 12 month period, columns (C) or (D)), both of which may engender more missing observations or higher granularity of exports and thus higher errors.

In several regressions presented in Tables 4 through 8 we obtain a large and positive coefficient for *D_CIA × D_Aaa-Aa3 × D_BASEL2,* something that is driven by exports to the United Arab Emirates (UAE). This is due to an unusually large shipment of steel products after 2012Q3 related with Turkish companies undertaking large construction projects in that country. We therefore investigate in Table 9 whether some of our results are not driven by large shipments when we exclude top 1% flows in each industry (columns A and B) or we exclude the UAE from the sample (columns C and D). The first observation is that the coefficient on *D_CIA × D_Aaa-Aa3 × D_BASEL2* is now not different from zero. The second is that our coefficients of interest do not change much by these changes.

Finally, in Table 10 we show the results of regressions on quarterly data with time effects to show that aggregation to two pre- and post-Basel 2 periods does not change our basic results and conclusions.

We have also ran "placebo" type regressions hypothetically assuming that Turkey's adoption of Basel 2 would take effect as of July 1, 2011 instead of July 1, 2012 presented in Table 11. We find no statistically significant changes in trade financed by any terms of payment or to any ratings class (so, coefficient estimates for *D_CLC × D_BASEL2, D_CLC × D_Aaa-Aa3×D_BASEL2,* etc.) following the hypothetical adoption relative to the initial period.

5. Discussion of the results and conclusion

In this study we make contributions to two different strands of research. First, we find that Basel 2 adoption has an impact on the real economy through exports (which are a component of the GDP). While the effect of adoption or changes in risk-based capital requirements on banks' supply of

[22] Turkey is a member of the EUCU since 1996 and also enjoys barrier-free trade to EFTA countries.

loans has been documented, we know of no *direct* evidence of their impact on the real sector besides Brun, Fraisse, and Thesmar (2013). These authors, use loan-level data and empirically show that Basel 2's adoption affected French firms' borrowing, working capital, employment and investment in a positive way. We complement their findings by providing evidence on the impact of changes in risk-based capital requirements on aggregate trade flows. Using industry-destination country trade data for Turkey, we document that Basel 2 adoption affects CLC-based shipments to different destinations differentially given the different changes in the risk-weights associated with holding CLCs. While our set-up does not allow us to draw precisely the welfare impact of Basel 2 adoption (in no small part, because our empirical set-up does not allow us to account for the totality of Turkey's exports) we show that differential changes in capital charges for export-related CLCs held by Turkish banks as off-balance sheet items affect trade flows. Our evidence is robust to various specifications and estimations limited to subsamples of the data.

Our second contribution is regarding the cost of trade term elasticity of exports. Our analysis yields empirical estimates of the percentage change in exports to groups of countries defined by the Basel 2 risk-weight groups. Dividing these with the percentage changes in risk-weights with Basel 2 adoption, we can calculate payment-term cost elasticities of CLC-based exports (in what follows, we base our calculations on our preferred estimates from column (D) of Table 4). Under the SA version of Basel 2, the risk-weights for CLCs with original maturities higher than 90 days issued by Aaa to Aa3 rated counterparty banks (in our case approximated by the rating of their country of domiciliation) decreased from 100% to 20%, an 80% decrease, while that for Ba1 to B3 rated destinations stayed at 100%. Following this decrease, post-Basel 2 the incidence of exports to Aaa to Aa3 rated countries increased by 65.5% when compared with shipments to Ba1 to B3 rated destinations during the same period. As a result, the CLC-clearing cost elasticity of exports to Aaa to Aa3 rated destinations can be calculated as 0.655/(-0.80) = -0.819 if we assume that CLCs have higher than 90 days of original maturity. Similarly, the risk-weights for CLCs with original maturities higher than 90 days issued by A1 to Baa3 rated destinations decreased by 50%, from 100% to 50%. The following this change the incidence of exports to the same destinations increased by 43.5%. The CLC-risk weight elasticity elasticity of exports is 0.435/(-0.50)= -0.870 in this case.[23] If we assume that the full savings were passed on to the customers and that the letters of credit cost typically 1%-5% of a trade transaction, these numbers would mean that the cost of exporting would change by 0.82% to 4.45%.

We can also back-out what would be a trade fall in imports of a country that would lose its good sovereign rating. For example, if a country would lose its high investment grade rating (*Aaa-*

[23] If we assume that the export-related CLCs have less than 90 days of maturity, we can use the coefficient estimate of 0.466 for *D_CLC×D_Aaa-Baa3_&_NR ×D_BASEL2_*in Table 6 column (C) or (D). Knowing that the risk-weight for shorter term investment-grade CLCs decreased from 100% under Basel 1 to 20% under Basel 2, we can calculate the same elasticity as: $[e^{0.466}-1] / (-0.80) = -0.742$.

Aa3) and pass to non-investment grade (Ba1 to B3) this would imply a 65.5%% fall in CLC-financed trade. Given the average usage of CLC instruments in the high investment category of 10.81% in total trade value (and assuming no substitution among the methods of payment) this implies a fall of approximately 7.1% of total trade value. Such a deterioration of ratings occurred for example to Ireland or Portugal in the period from 2010 to 2013. As a result, there may be not only a trade penalty for sovereign default as found in Rose (2005) but also a trade cost if the sovereign rating simply worsens.[24]

What was the overall change in exports value after the implementation of Basel 2 in Turkey? Given our results in Table 4, the savings in the cost of clearing letters of credit to highly-rated destinations do not seem to increase exports in a statistically significant way after the implementation of Basel 2 (the point estimate for the highest rated category Aaa-Aa3 indicates a 20.9% increase though). This is due to the fact that the regulation lowered the trade serviced by CLC instruments in general as witnessed by the negative and statistically significant coefficient on *D_CLC x D_BASEL* of -0.339. In the category of countries for which the costs did not change (Ba1 to B3 rating category) the overall effect on trade in CLC (sum of the coefficients on *D_BASEL + D_CLC×D_BASEL*) is -0.253 statistically significant at a 10% level, which means a 22.4% drop in the incidence ratio. At the same time, trade financed through cash in advance settlement (CIA) increased by 10% (sum of the coefficients on *D_BASEL + D_CIA×D_BASEL* is 0.095, statistically significant at 5% level), something which would not fully compensate for the fall in CLC-based trade.

Overall, we find a high sensitivity of Turkish exports to changes in trade finance, at least in some sectors heavily intermediated thru the usage of CLCs. Therefore, we see that the trade finance channel may play an important role in determining the trade flows as emphasized by Amiti and Weinstein (2011) or Chor and Manova (2012). How to reconcile that with the claims by Eaton et al. (2011) that the bulk of the fall of trade during the Great Recession could be attributed to a fall in trade in durable goods (that could have been affected in turn by a fall in demand)? If the patterns in Turkish trade generalize to other countries, perhaps this is because CLC instruments are often used in financing durable and investment good sectors (like machinery and equipment) or inputs into durable goods (like iron and steel) and changes in demand factors may coincide with the changes in financing terms.

We find that the Basel 2 implementation in Turkey had compositional effects on CLC-based exports. Trade intermediated via CLC increased to countries with investment-grade ratings relative to those rated Ba3 to B3. We estimate the elasticity of CLC-intermediated trade value to the changes in

[24] If our estimated trade flow/cost elasticities -0.75 to -0.87 hold also for countries in default (which we did not have in our sample), then in the Basel 2 system a default would increase the capital charge by 50% relative to the Ba1 to B3 rating category. Assuming that there would be no substitution between the methods of payment, the additional increase in costs of CLC trade would lower CLC trade by 50%. Passing from a non-investment grade rating to default would then imply (given a usage of 18.12% of CLC-based instruments in exports to the Ba1 to B3 rating category) a drop in total imports for such a country in the range of 6.8-7.9%.

the cost of capital to be held after issuance or confirmation of CLCs required by the new regulation to be around -0.75 to -0.85. At the same time, however, there was a fall in CLC-based exports in the post Basel 2 period for the latter countries. The relative decrease in capital charges on trade to investment-grade rated countries helped to offset the general fall in CLC-based trade. Furthermore, similar patterns are not observed for trade settled under different methods of payment (CIA, OA) or for industries using the letters of credit infrequently. These conclusions are upheld in the various robustness checks that we perform.

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Figure 1
Exports by financing terms over the period 2011Q3-2013Q2

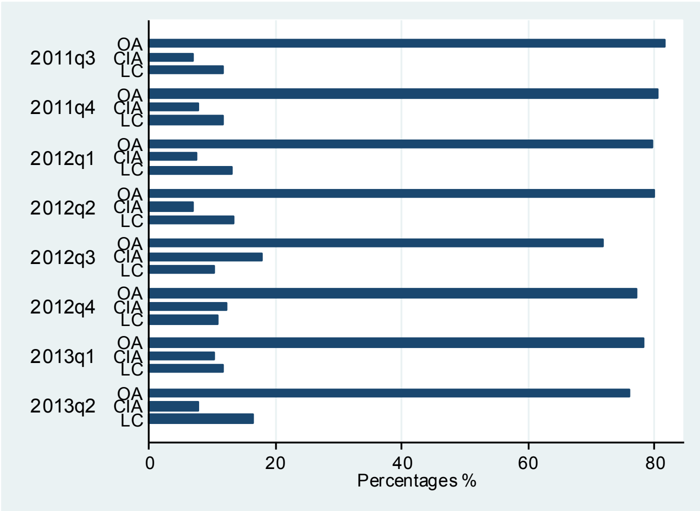
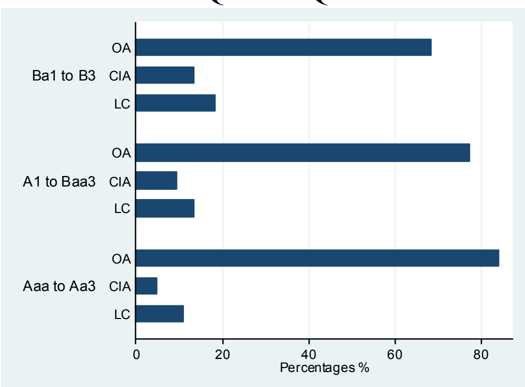


Figure 2
Aggregate exports by financing terms and credit rating categories

Pre-Basel 2: 2011Q3-2012Q2



Post-Basel 2: 2012Q3-2013Q2

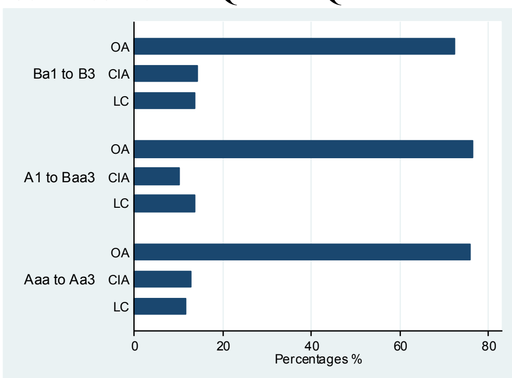


Table 1
Basel 1 and Basel 2 risk-weights applied to off-balance sheet commercial letters of credit

This table presents the Basel 1 and Basel 2 risk-weights applied to foreign bank liabilities held by the Turkish banks, including confirmed export related commercial letters of credit issued by foreign banking institutions (BDDK, 2007).

<table>
<tr><th colspan="2">Credit Rating</th><th colspan="3">Risk-Weight</th></tr>
<tr><th>Moody’s</th><th>S&P or Fitch’s</th><th>Basel 1</th><th colspan="2">Basel 2</th></tr>
<tr><th></th><th></th><th></th><th>CLC maturity
> 3 months</th><th>CLC maturity
< 3 months</th></tr>
<tr><td>Aaa to Aa3</td><td>AAA to AA-</td><td rowspan="6">1.00</td><td>0.20</td><td rowspan="3">0.20</td></tr>
<tr><td>A1 to A3</td><td>A+ to A-</td><td rowspan="2">0.50</td></tr>
<tr><td>Baa1 to Baa3</td><td>BBB+ to BBB-</td></tr>
<tr><td>Ba1 to B3</td><td>BB+ to B-</td><td>1.00</td><td>0.50</td></tr>
<tr><td>Caa1 and below</td><td>CCC+ and below</td><td>1.50</td><td>1.50</td></tr>
<tr><td>Non-rated (NR)</td><td>Non-rated (NR)</td><td>0.50</td><td>0.20</td></tr>
</table>

Table 2
Summary statistics

This table presents the summary statistics for the data used in the analysis. Our data covers 153 export destination countries, 22 ISIC industries, 3 payment terms, and 2 years, resulting in a panel of 20,196 observations. *EXPORTS* (the dependent variable) is the value of exports (in millions of U.S. dollars) from Turkey to country *c* in industry *i* during quarter *t*. *IMPORTS_EX_TUR* is destination country *c*'s imports from all other countries except Turkey during quarter *t* calculated using data from the IMF Direction of Trade Statistics (DOTS). *DISTANCE* is distance in kilometers between capital cities of destination countries and Turkey taken from CEPII database. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* stands for the eight countries that have a land border with Turkey; *CIA* stands for Commercial Cash in Advance; *CLC* for Commercial Letter of Credit; *OA* for Open Account. Please refer to Table 1 for Moody's and corresponding S&P and Fitch's rating classifications.

		Country-Industry-Year Observations (N = 20,196)				
	Basel 2 risk-weights	Mean	Std. Dev.	Min.	Median	Max.
EXPORTS		10.380	80.811	0.000	0.047	5,059
IMPORTS_EX_TUR		102,243	285,527	502.329	5,228	17,235
DISTANCE		5,904.407	3,936.933	502.329	5,227.964	17,234.530
D_ADJACENT		0.026	0.159	0	0	1
Financing terms						
D_CLC		0.333	0.471	0	0	1
D_OA		0.333	0.471	0	0	1
D_CIA		0.333	0.471	0	0	1
for CLCs with maturity > 3 months						
D_Aaa-Aa3	0.20	0.170	0.376	0	0	1
D_A1-Baa3_&_NR	0.50	0.542	0.498	0	1	1
D_A1-Baa3	0.50	0.183	0.387	0	0	1
D_NR	0.50	0.359	0.480	0	0	1
for CLCs with maturity < 3 months						
D_Aaa-Baa3_&_NR	0.20	0.712	0.453	0	1	1
D_Ba1-B3	0.50	0.288	0.453	0	0	1
D_Aaa-Baa3	0.20	0.353	0.478	0	0	1
D_NR	0.20	0.359	0.480	0	0	1

Note: EXPORTS and IMPORTS_EX_TUR are in million USD.

Table 3
Log-linear regressions with 12-months country-industry-level data

This table presents log-linear fixed-effects and PPML fixed effects regression results with 12-months Turkish exports at the country level. In columns (A) and (B) the dependent variable is the natural logarithm of $EXPORTS\_CLC_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars using CLCs [$ln(EXPORTS\_CLC_{c,t})$]; in columns (C) and (D) it is $EXPORTS\_CLC_{c,i,t}$. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. ADJACENT denotes countries that share a common land border with Turkey (i.e., Armenia, Azarbaijan, Bulgaria, Georgia, Greece, Irak, Iran and Syria); *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *Aaa-Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. The omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log-linear models				Poisson models			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.530	***	0.435		0.381	***	-0.0557	
	(0.0755)		(0.529)		(0.0735)		(0.586)	
ln(DISTANCE)	-0.629	***			-0.293			
	(0.172)				(0.194)			
D_ADJACENT	0.125				0.516			
	(0.843)				(0.813)			
D_Aaa-Aa3	0.0931				0.791			
	(0.454)				(0.533)			
D_A1-Baa3_&_NR	0.112				0.515			
	(0.321)				(0.343)			
D_BASEL2	0.0417		0.0583		-0.243	*	-0.223	
	(0.134)		(0.127)		(0.138)		(0.140)	
D_Aaa-Aa3 × D_BASEL2	0.187		0.185		0.450	*	0.428	*
	(0.238)		(0.233)		(0.257)		(0.253)	
D_A1-Baa3_&_NR × D_BASEL2	0.192		0.155		0.385	**	0.399	**
	(0.170)		(0.162)		(0.170)		(0.171)	
D_BASEL2 + D_Aaa-Aa3 × D_BASEL2	0.229		0.244		0.207		0.205	
D_BASEL2 + D_A1-Baa3_&_NR × D_BASEL2	0.233	**	0.214	*	0.142		0.176	
Estimator	OLS		OLS		PPML		PPML	
Number of observations	3064		3064		6732		6732	
R^2	0.396		0.558					
Clustered standard errors at the country-level	yes		yes		yes		yes	
Industry fixed-effects	yes		yes		yes		yes	
Country fixed-effects			yes				yes	

Table 4

Log-linear and PPML regressions with 12-months country-and-two-digit-industry-level data

This table presents log-linear fixed-effects and PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level. In columns (A) and (B) the dependent variable is the natural logarithm of $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars [$ln(EXPORTS_{c,t})$]; in columns (C) and (D) it is $EXPORTS_{c,i,t}$. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log-linear models				Poisson models			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.794	***	0.576	**	0.692	***	0.662	*
	(0.0509)		(0.250)		(0.0782)		(0.357)	
ln(DISTANCE)	-1.299	***			-0.774	***		
	(0.104)				(0.154)			
D_ADJACENT	1.234				1.419	*		
	(0.823)				(0.751)			
D_Aaa-Aa3	0.402				0.761	**		
	(0.328)				(0.310)			
D_A1-Baa3_&_NR	0.440	*			0.601	**		
	(0.219)				(0.266)			
D_BASEL2	0.232	***	0.235	***	0.0877	*	0.0853	

	(0.103)		(0.102)		(0.0570)		(0.0631)	
D_CLC	-2.054	***	-2.281	***	-1.331	***	-1.331	***
	(0.299)		(0.299)		(0.338)		(0.338)	
D_CLC × D_Aaa-Aa3	-0.946	**	-1.070	***	-0.721		-0.721	
	(0.418)		(0.392)		(0.534)		(0.534)	
D_CLC × D_A1-Baa3_&_NR	-0.288		-0.382		-0.424		-0.424	
	(0.379)		(0.381)		(0.458)		(0.458)	
D_CLC × D_BASEL2	-0.215		-0.206		-0.339	**	-0.339	**
	(0.139)		(0.135)		(0.142)		(0.142)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.167		0.241		0.504	**	0.504	**
	(0.227)		(0.233)		(0.250)		(0.250)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.288		0.315	*	0.361	**	0.361	**
	(0.182)		(0.181)		(0.171)		(0.171)	
D_CIA	-1.736	***	-1.799	***	-1.642	***	-1.642	***
	(0.110)		(0.109)		(0.0971)		(0.0971)	
D_CIA × D_Aaa-Aa3	-0.744	***	-0.749	***	-1.196	***	-1.196	***
	(0.175)		(0.160)		(0.298)		(0.298)	
D_CIA × D_A1-Baa3_&_NR	-0.424	***	-0.481	***	-0.470	***	-0.470	***
	(0.150)		(0.141)		(0.123)		(0.123)	
D_CIA × D_BASEL2	0.0687		0.0595		0.00976		0.00976	
	(0.122)		(0.121)		(0.0505)		(0.0505)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	-0.0907		-0.0713		1.047		1.047	
	(0.138)		(0.135)		(0.642)		(0.642)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	0.193		0.200		0.0697		0.0697	
	(0.149)		(0.147)		(0.0716)		(0.0716)	
D_BASEL2 + D_Aaa-Aa3×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC×D_Aaa-Aa3×D_BASEL2 = 0	0.180		0.251		0.214		0.209	
D_BASEL2 + D_A1-Baa3_&_NR ×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC× D_A1-Baa3_&_NR ×D_BASEL2 = 0	0.156		0.190		0.129		0.0761	
Estimator	OLS		OLS		PPML		PPML	

Number of observations	13493	13493	20196	20196
R^2	0.537	0.634		
Clustered standard errors at the country-level	yes	yes	yes	yes
Industry fixed-effects	yes	yes	yes	yes
Country fixed-effects		yes		yes

Table 5
Log-linear and PPML regressions with 12-months country-and-two-digit-industry-level data using short-term risk-weights for grouping countries

This table presents log-linear fixed-effects and PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level using short-term risk-weights for grouping countries. In columns (A) and (B) the dependent variable is the natural logarithm of $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars [$ln(EXPORTS_{c,t})$]; in columns (C) and (D) it is $EXPORTS_{c,i,t}$. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; *Aaa- Baa3_&_NR* for Moody's (S&P and Fitch) investment-grade risk-rating categories between Aaa and Baa3 (AAA and BBB-) plus the non-rated (*NR*) for which the Basel 2 risk-weight for short-term CLCs is 0.20. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight is 0.50. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log-linear models				Poisson models			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.762	***	0.586	**	0.714	***	0.559	**
	(0.0348)		(0.246)		(0.0656)		(0.230)	
ln(DISTANCE)	-1.269	***	.		-0.794	***		
	(0.0973)		.		(0.137)			
D_ADJACENT	1.351		.		1.379	*		
	(0.808)		.		(0.754)			
D_Aaa-Baa3_&_NR	0.455	**	.		0.658	***		
	(0.205)		.		(0.236)			
D_BASEL2	0.234	***	0.235	***	0.0872	*	0.0895	*
	(0.0808)		(0.0775)		(0.0508)		(0.0510)	
D_Aaa-Baa3_&_NR×D_BASEL2	-0.111		-0.118		-0.0212		-0.0410	
	(0.0933)		(0.0905)		(0.0544)		(0.0534)	

D_CLC	-2.039	***	-2.283	***	-1.331	***	-1.331	***
	(0.300)		(0.297)		(0.338)		(0.338)	
D_CLC×D_Aaa-Baa3_&_NR	-0.495		-0.577	*	-0.612		-0.612	
	(0.350)		(0.344)		(0.418)		(0.418)	
D_CLC×D_BASEL2	-0.215		-0.205		-0.339	**	-0.339	**
	(0.139)		(0.135)		(0.142)		(0.142)	
D_CLC×D_Aaa-Baa3_&_NR×D_BASEL2	0.271		0.310	*	0.466	**	0.466	**
	(0.169)		(0.168)		(0.182)		(0.182)	
D_CIA	-1.729	***	-1.797	***	-1.642	***	-1.642	***
	(0.111)		(0.108)		(0.0971)		(0.0971)	
D_CIA×D_Aaa-Baa3_&_NR	-0.545	***	-0.582	***	-0.915	***	-0.915	***
	(0.138)		(0.129)		(0.195)		(0.195)	
D_CIA×D_BASEL2	0.0663		0.0584		0.00976		0.00976	
	(0.122)		(0.120)		(0.0505)		(0.0505)	
D_CIA×D_Aaa-Baa3_&_NR×D_BASEL2	0.113		0.123		0.591		0.591	
	(0.136)		(0.133)		(0.417)		(0.417)	
D_BASEL2 + D_Aaa-Baa3_&_NR×D_BASEL2+ D_CLC×D_BASEL2 + D_CLC×D_Aaa-Baa3_&_NR×D_BASEL2 = 0	0.179	*	0.221	**	0.194		0.176	
Estimator	OLS		OLS		PPML		PPML	
Number of observations	14097		14097		20856		20856	
R^2	0.540		0.487					
Clustered standard errors at the country-level	yes		yes		yes		yes	
Industry fixed-effects	yes		yes		yes		yes	
Country fixed-effects			yes				yes	

Table 6
PPML regressions with 12-months country-and-two-digit-industry-level data: high and low share LC industries

This table presents PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level splitting the sample according to higher (columns (A) and (B)) or lower (columns (C) and (D) respectively) usage of CLCs in trade in 2010. In all columns the dependent variable is $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	High share of CLC				Low share of CLC			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.620	***	0.677	*	0.880	***	0.549	*
	(0.0732)		(0.385)		(0.0953)		(0.297)	
ln(DISTANCE)	-0.643	***			-1.103	***		
	(0.150)				(0.178)			
D_ADJACENT	1.585	**			1.053			
	(0.729)				(0.815)			
D_Aaa-Aa3	0.698	**			0.747	**		
	(0.334)				(0.325)			
D_A1-Baa3_&_NR	0.635	**			0.514	*		
	(0.280)				(0.293)			

D_BASEL2	0.101	*	0.0955		0.0573		0.0631	
	(0.0594)		(0.0616)		(0.0499)		(0.0507)	
D_Aaa-Aa3 × D_BASEL2	-0.0814		-0.0852		0.0279		0.0165	
	(0.0720)		(0.0692)		(0.0584)		(0.0608)	
D_A1-Baa3_&_NR × D_BASEL2	0.00151		-0.0510		0.0576		0.0206	
	(0.0648)		(0.0725)		(0.0637)		(0.0636)	
D_CLC	-1.027	***	-1.027	***	-3.274	***	-3.274	***
	(0.329)		(0.329)		(0.348)		(0.348)	
D_CLC × D_Aaa-Aa3	-0.515		-0.515		-0.304		-0.304	
	(0.543)		(0.543)		(0.394)		(0.394)	
D_CLC × D_A1-Baa3_&_NR	-0.422		-0.422		0.0261		0.0261	
	(0.461)		(0.461)		(0.559)		(0.560)	
D_CLC × D_BASEL2	-0.384	**	-0.384	**	0.248	**	0.248	**
	(0.153)		(0.153)		(0.109)		(0.109)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.569	**	0.569	**	-0.0450		-0.0451	
	(0.266)		(0.266)		(0.238)		(0.238)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.403	**	0.403	**	-0.121		-0.121	
	(0.183)		(0.183)		(0.143)		(0.143)	
D_CIA	-1.541	***	-1.541	***	-1.940	***	-1.940	***
	(0.116)		(0.116)		(0.145)		(0.145)	
D_CIA × D_Aaa-Aa3	-1.016	***	-1.016	***	-1.378	***	-1.378	***
	(0.361)		(0.361)		(0.230)		(0.230)	
D_CIA × D_A1-Baa3_&_NR	-0.443	***	-0.443	***	-0.524	***	-0.524	***
	(0.151)		(0.151)		(0.191)		(0.191)	
D_CIA × D_BASEL2	-0.0476		-0.0476		0.187	*	0.187	*
	(0.0697)		(0.0697)		(0.103)		(0.103)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	1.346	*	1.346	*	-0.0901		-0.0901	
	(0.750)		(0.750)		(0.169)		(0.169)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	0.112		0.112		-0.0497		-0.0497	
	(0.0989)		(0.0989)		(0.133)		(0.133)	
D_BASEL2 + D_Aaa-Aa3×D_BASEL2	0.204		0.195		0.288		0.282	

	(1)	(2)	(3)	(4)
+ D_CLC×D_BASEL2 + D_CLC×D_Aaa-Aa3×D_BASEL2 = 0				
D_BASEL2 + D_A1-Baa3_&_NR ×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC× D_A1-Baa3_&_NR ×D_BASEL2 = 0	0.121	0.0634	0.242 **	0.211 **
Estimator	PPML	PPML	PPML	PPML
Number of observations	10098	10098	10098	10098
R^2				
Clustered standard errors at the country-level	yes	yes	yes	Yes
Industry fixed-effects	yes	yes	yes	Yes
Country fixed-effects		yes		Yes

Table 7
PPML with 12-months country-and-two-digit-industry-level data: WTO and non-OECD countries

This table presents PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level restricting the sample either to just WTO countries (columns (A) and (B)) or those not belonging to the OECD (columns (C) and (D)). In all columns the dependent variable is $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	WTO countries				Non-OECD countries			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.743	***	0.698		0.601	***	0.318	
	(0.0922)		(0.867)		(0.0623)		(0.342)	
ln(DISTANCE)	-0.914	***			-1.306	***		
	(0.136)				(0.141)			
D_ADJACENT	0.458				1.671	***		
	(0.474)				(0.171)			
D_Aaa-Aa3	0.441				1.454	***		
	(0.302)				(0.390)			
D_A1-Baa3_&_NR	-0.182				1.411	***		
	(0.264)				(0.249)			
D_BASEL2	0.0843		0.0837		0.0977	*	0.0994	**
	(0.0613)		(0.0775)		(0.0510)		(0.0506)	
D_Aaa-Aa3 × D_BASEL2	-0.0342		-0.0406		0.0427		0.0511	
	(0.0670)		(0.0805)		(0.0918)		(0.0889)	

D_A1-Baa3_&_NR × D_BASEL2	0.0107		0.00479		-0.00931		0.0108	
	(0.0656)		(0.0804)		(0.0595)		(0.0646)	
D_CLC	-1.313	***	-1.313	***	-1.331	***	-1.331	***
	(0.401)		(0.401)		(0.339)		(0.339)	
D_CLC × D_Aaa-Aa3	-0.740		-0.740		0.495		0.495	
	(0.576)		(0.576)		(0.460)		(0.460)	
D_CLC × D_A1-Baa3_&_NR	-0.0731		-0.0731		-0.339		-0.339	
	(0.486)		(0.486)		(0.483)		(0.483)	
D_CLC × D_BASEL2	-0.384	**	-0.384	**	-0.339	**	-0.339	**
	(0.174)		(0.174)		(0.143)		(0.143)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.550	**	0.550	**	0.447	*	0.447	*
	(0.269)		(0.269)		(0.258)		(0.258)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.347		0.347		0.286	*	0.286	*
	(0.222)		(0.222)		(0.170)		(0.170)	
D_CIA	-1.672	***	-1.672	***	-1.642	***	-1.642	***
	(0.0867)		(0.0867)		(0.0971)		(0.0971)	
D_CIA × D_Aaa-Aa3	-1.166	***	-1.166	***	-0.837	***	-0.837	***
	(0.295)		(0.295)		(0.190)		(0.190)	
D_CIA × D_A1-Baa3_&_NR	-0.616	***	-0.616	***	-0.427	***	-0.427	***
	(0.152)		(0.152)		(0.127)		(0.127)	
D_CIA × D_BASEL2	-0.0220		-0.0220		0.00976		0.00976	
	(0.0653)		(0.0653)		(0.0505)		(0.0505)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	1.078	*	1.078	*	1.767	**	1.767	**
	(0.644)		(0.644)		(0.727)		(0.727)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	0.0274		0.0274		0.0653		0.0653	
	(0.0991)		(0.0991)		(0.0768)		(0.0768)	
D_BASEL2 + D_Aaa-Aa3×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC×D_Aaa-Aa3×D_BASEL2 = 0	0.216		0.209		0.249		0.259	
D_BASEL2 + D_A1-Baa3_&_NR ×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC× D_A1-Baa3_&_NR ×D_BASEL2 = 0	0.0579		0.0514		0.0360		0.0578	

Estimator	PPML	PPML	PPML	PPML
Number of observations	16104	16104	17292	17292
R^2				
Clustered standard errors at the country-level	yes	yes	yes	yes
Industry fixed-effects	yes	yes	yes	yes
Country fixed-effects		yes		yes

Table 8
PPML regressions with 12-months country-and-two-digit-industry-level data: large countries in terms of GDP and Turkish exports

This table presents PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level restricting the sample to countries with a GDP larger than $10bn in 2010 in PPP terms according to PWT (columns (A) and (B)) or top 75% export destinations within the first period of the sample (columns (C) and (D)). In all columns the dependent variable is $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	GDP>$10bn in 2010				Export destination > 25 pct			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.681	***	0.783	**	0.653	***	0.678	*
	(0.0914)		(0.382)		(0.0887)		(0.360)	
ln(DISTANCE)	-0.750	***			-0.726	***		
	(0.159)				(0.159)			
D_ADJACENT	1.432	*			1.461	**		
	(0.744)				(0.738)			
D_Aaa-Aa3	0.776	**			0.776	**		
	(0.326)				(0.304)			
D_A1-Baa3_&_NR	0.621	**			0.569	**		
	(0.284)				(0.245)			
D_BASEL2	0.0887	*	0.0815		0.0798		0.0780	
	(0.0512)		(0.0543)		(0.0511)		(0.0530)	
D_Aaa-Aa3 × D_BASEL2	-0.0409		-0.0377		-0.0327		-0.0351	
	(0.0584)		(0.0589)		(0.0584)		(0.0580)	

D_A1-Baa3_&_NR × D_BASEL2	0.0148		-0.0502		0.0259		-0.0284	
	(0.0575)		(0.0666)		(0.0570)		(0.0635)	
D_CLC	-1.325	***	-1.325	***	-1.327	***	-1.327	***
	(0.340)		(0.340)		(0.340)		(0.340)	
D_CLC × D_Aaa-Aa3	-0.728		-0.728		-0.725		-0.725	
	(0.535)		(0.535)		(0.535)		(0.535)	
D_CLC × D_A1-Baa3_&_NR	-0.549		-0.549		-0.430		-0.430	
	(0.463)		(0.463)		(0.460)		(0.460)	
D_CLC × D_BASEL2	-0.341	**	-0.341	**	-0.346	**	-0.346	**
	(0.143)		(0.143)		(0.144)		(0.144)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.506	**	0.506	**	0.510	**	0.510	**
	(0.250)		(0.250)		(0.251)		(0.251)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.333	*	0.333	*	0.367	**	0.367	**
	(0.171)		(0.171)		(0.172)		(0.172)	
D_CIA	-1.640	***	-1.640	***	-1.639	***	-1.639	***
	(0.0976)		(0.0976)		(0.0974)		(0.0974)	
D_CIA × D_Aaa-Aa3	-1.198	***	-1.198	***	-1.199	***	-1.199	***
	(0.299)		(0.299)		(0.299)		(0.299)	
D_CIA × D_A1-Baa3_&_NR	-0.476	***	-0.476	***	-0.474	***	-0.474	***
	(0.125)		(0.125)		(0.124)		(0.124)	
D_CIA × D_BASEL2	0.00382		0.00382		0.00944		0.00944	
	(0.0512)		(0.0512)		(0.0508)		(0.0508)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	1.053		1.053		1.047		1.047	
	(0.643)		(0.643)		(0.643)		(0.643)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	0.0707		0.0707		0.0671		0.0671	
	(0.0737)		(0.0737)		(0.0723)		(0.0723)	
D_BASEL2 + D_Aaa-Aa3×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC×D_Aaa-Aa3×D_BASEL2 = 0	0.213		0.210		0.211		0.206	
D_BASEL2 + D_A1-Baa3_&_NR ×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC× D_A1-Baa3_&_NR ×D_BASEL2 = 0	0.0958		0.0237		0.126		0.0701	

Estimator	PPML	PPML	PPML	PPML
Number of observations	15048	15048	15048	15048
R^2				
Clustered standard errors at the country-level	yes	yes	yes	yes
Industry fixed-effects	yes	yes	yes	yes
Country fixed-effects		yes		yes

Table 9
PPML regressions with 12-months country-and-two-digit-industry-level data: flows trimmed at top 1% and observations for United Arab Emirates (UAE) excluded

This table presents PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level restricting the sample to flows below the top 1% in each industry (columns (A) and (B)) or excluding observations for United Arab Emirates (columns (C) and (D)). In all columns the dependent variable is $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	1% top flows trimmed				Without UAE			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.566	***	0.362		0.718	***	0.385	
	(0.0537)		(0.252)		(0.0791)		(0.258)	
ln(DISTANCE)	-0.729	***			-0.779	***		
	(0.0951)				(0.158)			
D_ADJACENT	0.684				1.437	*		
	(0.518)				(0.752)			
D_Aaa-Aa3	0.349				0.658	**		
	(0.259)				(0.301)			
D_A1-Baa3_&_NR	0.445	*			0.568	**		
	(0.237)				(0.265)			
D_BASEL2	0.0297		0.0369		0.0866	*	0.0966	*
	(0.0317)		(0.0326)		(0.0510)		(0.0501)	
D_Aaa-Aa3 × D_BASEL2	-0.0104		-0.00421		-0.0330		-0.0495	
	(0.0678)		(0.0642)		(0.0592)		(0.0597)	

D_A1-Baa3_&_NR × D_BASEL2	-0.00331		-0.00754		0.0183		-0.00521	
	(0.0654)		(0.0544)		(0.0574)		(0.0559)	
D_CLC	-1.316	***	-1.317	***	-1.331	***	-1.331	***
	(0.339)		(0.339)		(0.338)		(0.338)	
D_CLC × D_Aaa-Aa3	-0.538		-0.542		-0.886		-0.886	
	(0.395)		(0.398)		(0.556)		(0.556)	
D_CLC × D_A1-Baa3_&_NR	-0.219		-0.291		-0.424		-0.424	
	(0.425)		(0.441)		(0.458)		(0.458)	
D_CLC × D_BASEL2	-0.275	**	-0.278	**	-0.339	**	-0.339	**
	(0.138)		(0.138)		(0.142)		(0.142)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.493	**	0.478	**	0.586	**	0.586	**
	(0.214)		(0.217)		(0.279)		(0.279)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.419	**	0.399	**	0.361	**	0.361	**
	(0.176)		(0.171)		(0.171)		(0.171)	
D_CIA	-1.627	***	-1.628	***	-1.642	***	-1.642	***
	(0.103)		(0.103)		(0.0971)		(0.0971)	
D_CIA × D_Aaa-Aa3	-0.517	**	-0.530	**	-1.211	***	-1.211	***
	(0.247)		(0.252)		(0.315)		(0.315)	
D_CIA × D_A1-Baa3_&_NR	-0.0970		-0.176		-0.470	***	-0.470	***
	(0.223)		(0.188)		(0.123)		(0.123)	
D_CIA × D_BASEL2	0.0735	*	0.0706*		0.00976		0.00976	
	(0.0380)		(0.0378)		(0.0505)		(0.0505)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	0.0129		-0.00150		0.0386		0.0386	
	(0.181)		(0.178)		(0.198)		(0.198)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	0.0907		0.0774		0.0697		0.0697	
	(0.0799)		(0.0753)		(0.0716)		(0.0716)	
D_BASEL2 + D_Aaa-Aa3×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC×D_Aaa-Aa3×D_BASEL2 = 0	0.237		0.233		0.301		0.295	
D_BASEL2 + D_A1-Baa3_&_NR ×D_BASEL2 + D_CLC×D_BASEL2 + D_CLC× D_A1-Baa3_&_NR ×D_BASEL2 = 0	0.171	*	0.150	*	0.128		0.114	

Estimator	PPML	PPML	PPML	PPML
Number of observations	19977	19977	20064	20064
R^2				
Clustered standard errors at the country-level	yes	yes	yes	yes
Industry fixed-effects	yes	yes	yes	yes
Country fixed-effects		yes		yes

Table 10
Log-linear and PPML regressions with quarterly country-and-two-digit-industry-level data

This table presents log-linear fixed-effects and PPML fixed effects regression results with quarterly Turkish exports at the country-and-two-digit-industry-level. In columns (A) and (B) the dependent variable is the natural logarithm of $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars [$ln(EXPORTS_{c,t})$]; in columns (C) and (D) it is $EXPORTS_{c,i,t}$. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2012 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log-linear models				Poisson models			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.681	***	0.403	*	0.692	***	0.523	**
	(0.0471)		(0.220)		(0.0780)		(0.240)	
ln(DISTANCE)	-1.188	***			-0.775	***		
	(0.0897)				(0.154)			
D_ADJACENT	1.362	*			1.418	*		
	(0.733)				(0.751)			
D_Aaa-Aa3	0.651	**			0.768	**		
	(0.282)				(0.310)			
D_A1-Baa3_&_NR	0.466	**			0.607	**		
	(0.198)				(0.267)			
D_Aaa-Aa3 × D_BASEL2	0.00958		-0.0122		-0.0391		-0.0492	
	(0.0715)		(0.0721)		(0.0583)		(0.0564)	
D_A1-Baa3_&_NR × D_BASEL2	0.0215		0.0104		0.0184		-0.0196	
	(0.0671)		(0.0653)		(0.0569)		(0.0567)	
D_CLC	-1.623	***	-1.839	***	-1.330	***	-1.330	***
	(0.294)		(0.300)		(0.338)		(0.338)	

D_CLC × D_Aaa-Aa3	-1.098	***	-1.213	***	-0.722		-0.722	
	(0.406)		(0.400)		(0.534)		(0.534)	
D_CLC × D_A1-Baa3_&_NR	-0.300		-0.348		-0.425		-0.425	
	(0.388)		(0.397)		(0.457)		(0.457)	
D_CLC × D_BASEL2	-0.143		-0.131		-0.336	**	-0.336	**
	(0.100)		(0.0924)		(0.142)		(0.142)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.126		0.146		0.502	**	0.502	**
	(0.145)		(0.141)		(0.249)		(0.249)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.117		0.124		0.358	**	0.358	**
	(0.135)		(0.125)		(0.171)		(0.171)	
D_CIA	-1.723	***	-1.812	***	-1.642	***	-1.642	***
	(0.0957)		(0.0898)		(0.0970)		(0.0970)	
D_CIA × D_Aaa-Aa3	-0.865	***	-0.859	***	-1.196	***	-1.196	***
	(0.173)		(0.162)		(0.298)		(0.298)	
D_CIA × D_A1-Baa3_&_NR	-0.296	**	-0.337	***	-0.469	***	-0.469	
	(0.132)		(0.118)		(0.123)		(0.123)	
D_CIA × D_BASEL2	0.125		0.116		0.00914		0.00914	
	(0.0923)		(0.0916)		(0.0505)		(0.0505)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	-0.126		-0.123		1.047		1.047	
	(0.104)		(0.103)		(0.642)		(0.642)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	0.0360		0.0544		0.0703		0.0703	
	(0.108)		(0.106)		(0.0716)		(0.0716)	
Estimator	OLS		OLS		PPML		PPML	
Number of observations	44658		44658		81312		81312	
R^2	0.499		0.583					
Clustered standard errors at the country-level	yes		yes		yes		yes	
Industry fixed-effects	yes		yes		yes		yes	
Country fixed-effects			yes				yes	
Time fixed-effects	yes		yes		yes		yes	

Table 11

Log-linear and PPML "placebo" regressions with 12-months country-and-two-digit-industry-level data assuming the adoption of Basel 2 as of July 1, 2011

This table presents log-linear fixed-effects and PPML fixed effects regression results with 12-months Turkish exports at the country-and-two-digit-industry-level assuming the adoption of Basel 2 as of July 1, 2011 instead of July 1, 2012. In columns (A) and (B) the dependent variable is the natural logarithm of $EXPORTS_{c,i,t}$ from Turkey to country *c* in industry *i* in period *t* in U.S. dollars [$ln(EXPORTS_{c,t})$]; in columns (C) and (D) it is $EXPORTS_{c,i,t}$. $ln(IMPORTS\_EX\_TUR_{c,t})$ is the natural logarithm of imports of destination country *c* in period t after excluding country *c*'s Turkish imports. $ln(DISTANCE_c)$ is the natural logarithm of the distance between the capital cities of the destination countries and Turkey. Indicator variables, whose names are preceded by a prefix *D_*, are equal to one for if the observation belongs to the category of the indicator variable, and zero otherwise. *ADJACENT* denotes countries that share a common land border with Turkey; *BASEL2* denotes after July 1, 2011 period following Basel 2 adoption in Turkey; *CLC* denotes commercial letters of credit-based exports; *CIA* denotes cash in advance-based exports; Aaa-*Aa3* for Moody's (S&P and Fitch) highest investment-grade risk-rating categories between Aaa and Aa3 (AAA and AA-) for which the Basel 2 risk-weight for CLCs is 0.20; *A1-Baa3_&_NR* for Moody's (S&P and Fitch) lower investment-grade risk-rating categories between A1 and Baa3 (A+ and BBB-) plus the non-rated (*NR*) destination countries for which the Basel 2 risk-weight for CLCs is 0.50. For any payment type the omitted category is destination countries with Moody's ratings from Ba1 to B3 (S&P and Fitch ratings between BB+ to B-) for which the Basel 2 risk-weight remains equal to Basel 1 risk-weight of 100%. The base case is formed by open account (OA) based exports. Regression standard errors are clustered at the destination country level. Standard errors are provided within parentheses below the coefficient estimates. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log-linear models				Poisson models			
	(A)		(B)		(C)		(D)	
ln(IMPORTS_EX_TUR)	0.786	***	0.833	***	0.754	***	0.797	***
	(0.0351)		(0.0989)		(0.0588)		(0.129)	
ln(DISTANCE)	-1.335	***			-0.832	***		
	(0.0780)				(0.104)			
D_ADJACENT	1.534	**			1.408	**		
	(0.638)				(0.586)			
D_Aaa-Aa3	0.321				0.483	*		
	(0.264)				(0.276)			
D_A1-Baa3_&_NR	0.276				0.360			
	(0.194)				(0.240)			
D_BASEL2	-0.0616		-0.121		-0.0905		-0.0156	
	(0.183)		(0.424)		(0.188)		(0.383)	
D_Aaa-Aa3 × D_BASEL2	0.113		0.382		0.105		-0.181	
	(0.317)		(0.608)		(0.325)		(0.441)	

D_A1-Baa3_&_NR × D_BASEL2	0.165		0.412		0.168		-0.0287	
	(0.285)		(0.538)		(0.346)		(0.470)	
D_CLC	-1.952	***	-2.156	***	-1.399	***	-1.445	***
	(0.259)		(0.276)		(0.230)		(0.243)	
D_CLC × D_Aaa-Aa3	-1.076	***	-0.944	**	-0.579		-0.536	
	(0.373)		(0.396)		(0.504)		(0.495)	
D_CLC × D_A1-Baa3_&_NR	-0.411		-0.117		-0.477		-0.415	
	(0.363)		(0.384)		(0.401)		(0.424)	
D_CLC × D_BASEL2	-0.117		0.0562		0.0682		0.114	
	(0.326)		(0.349)		(0.396)		(0.377)	
D_CLC × D_Aaa-Aa3 × D_BASEL2	0.146		-0.185		-0.143		-0.186	
	(0.492)		(0.529)		(0.683)		(0.641)	
D_CLC × D_A1-Baa3_&_NR × D_BASEL2	0.128		-0.277		0.0525		-0.00918	
	(0.469)		(0.498)		(0.597)		(0.579)	
D_CIA	-1.927***	***	-2.112***	***	-1.807***	***	-1.854***	***
	(0.0935)		(0.198)		(0.0644)		(0.165)	
D_CIA × D_Aaa-Aa3	-0.654***	***	-0.408	***	-1.324***	***	-1.282***	***
	(0.181)		(0.313)		(0.219)		(0.261)	
D_CIA × D_A1-Baa3_&_NR	-0.225	***	0.0407	***	-0.363***	***	-0.296	***
	(0.138)		(0.278)		(0.112)		(0.208)	
D_CIA × D_BASEL2	0.190		0.353		0.165		0.212	
	(0.143)		(0.246)		(0.112)		(0.195)	
D_CIA × D_Aaa-Aa3 × D_BASEL2	-0.0889		-0.335		0.128		0.0859	
	(0.205)		(0.371)		(0.361)		(0.390)	
D_CIA × D_A1-Baa3_&_NR × D_BASEL2	-0.201		-0.511		-0.106		-0.174	
	(0.190)		(0.334)		(0.165)		(0.240)	
Estimator	OLS		OLS		PPML		PPML	
Number of observations	13547		13547		20592		20592	
R^2	0.546		0.557					
Clustered standard errors at the country-level	yes		yes		yes		yes	
Industry fixed-effects	yes		yes		yes		yes	
Country fixed-effects			yes				yes	